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# ARMS INDUSTRIES:

New Suppliers and  
Regional Security

Ralph Sanders

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*Ralph Sanders*



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Washington, D.C.

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## CONTENTS

<i>Foreword</i> .....	ix
<i>Preface</i> .....	xi
1. Overview .....	3
2. Argentina and Brazil .....	23
3. India and Israel .....	41
4. South Africa .....	67
5. South Korea and Taiwan .....	77
6. The Current Arms Environment .....	97
7. National Security Implications .....	107
8. Foreign Procurement During US Mobilization .....	133
9. US Policy Options .....	155
<i>Notes</i> .....	169
<i>Index</i> .....	191
<i>The Author</i> .....	199

## MAP

Seven New Arms Suppliers in the World Market .. 2

## FOREWORD

**A**s part of its mission, the Industrial College of the Armed Forces of the National Defense University continuously examines trends in defense industries worldwide. It should come as no surprise, then, that Dr. Ralph Sanders, the school's J. Carlton Ward, Jr. Distinguished Professor (now emeritus), formed and directed a research team of students to look into the rise of arms industries in newly industrializing countries. In this book, Dr. Sanders has updated, revised, and added significantly to the initial study, completing it as a Senior Fellow with the University.

In the United States we think chiefly of our own country and other major powers such as the Soviet Union, Great Britain, and France as international arms producers and exporters. Sometimes we include a few other European nations (Sweden, Switzerland and Belgium) and Japan. Yet, almost unnoticed by most of us, a number of the more technologically advanced Third World countries have built significant arsenals. These nations now manufacture and export sizable quantities of arms. In this volume, Dr. Sanders explores the nature of arms production growth in these industrially vibrant countries and assesses the consequent implications for US national security.

This volume represents both a concrete dividend for Industrial College support of Dr. Sanders'

x      *Sanders*

research and a notable product of the National Defense University's Senior Fellowship program. Dr. Sanders' analysis should increase understanding within the national security community as well as throughout the public at large about the dynamics of arms production in the Third World. His recommendations should provide guideposts for decisionmakers confronting major policy questions associated with these new arsenals.

A handwritten signature in dark ink, appearing to read 'BCHosmer', written in a cursive style.

BRADLEY C. HOSMER  
Lieutenant General, US Air Force  
President, National Defense University

## PREFACE

**T**his study explores the national security implications to the United States of the spread of arms production capabilities in newly industrializing countries. Some scholars have touched on this topic in passing when studying the role of the major arms suppliers in the world's arms traffic. Others are just beginning to create a literature that specifically examines this subject. It is hoped that this volume will prove a useful addition to the modest number of writings currently devoted to the growth of weapons manufacturing in countries which have experienced considerable economic growth within the last two or three decades.

In examining this subject, *the author has* ~~I have~~ tried to place it in its widest context. While citing specific armament production and foreign sales data, this study focuses on political, economic, and military implications. It especially pays attention to the regional implications of such production. The seven countries examined here (Argentina, Brazil, India, Israel, South Korea, Taiwan, and South Africa) are all in the noncommunist world. Furthermore, they have been characterized as "newly industrializing" because although they have developed considerable and modern economic resources they have failed to reach the industrial level of the United States, Western Europe, or

→ OVER

Japan. They also represent a broad geographic range with major political, cultural, philosophical, and social differences. Moreover, they account for a large share of the total arms manufactured and sold by newly industrializing nations in the noncommunist world. (KR)

No attempt is made to assess the impact on arms industries of *glasnost* or *perestroika* or to determine whether the new Soviet rhetoric will be followed by genuine conventional and nuclear force reductions.

This study does not contend that conventional arms production proliferation has or will become the most critical issue for US decisionmakers. Rather, it argues that the rise of these new sources of weaponry poses significant foreign policy questions that US decisionmakers increasingly will have to take into account. It should help set the stage for and develop the context of an important aspect of our national security debate.

This subject is especially relevant to the course of study conducted at the Industrial College of the Armed Forces of the National Defense University. This senior service college specializes in examining the role of resources for supporting national security policy and military strategy. In 1983 I had the privilege of leading a student research team composed of Jon Edensword, Robert Falkenbach, Robert Juenling, Jacques Gerard, Michael Mahoney and Frank Ruggeri to ferret out basic information about arms production in the newly industrializing world. Although I have revised and added to the original study significantly and, in fact, completed the manuscript after retiring from government service, I owe this group a profound debt. Special appreciation is

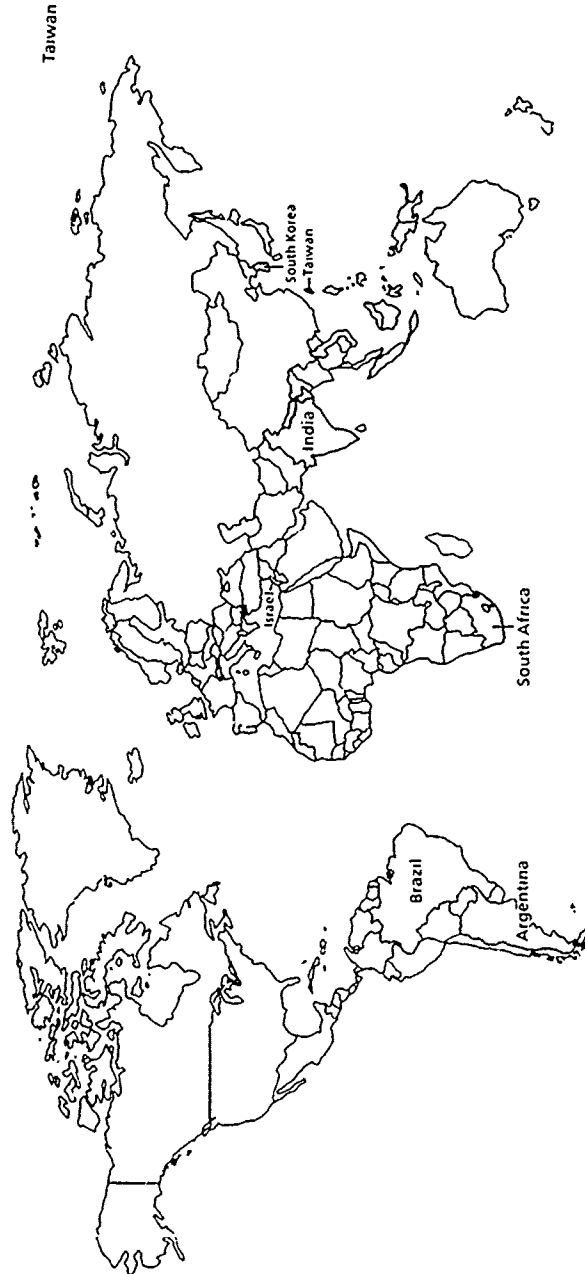
due to Alice Crupi and her associates who typed the initial draft of this study. I also want to thank Dr. Dora Alves for her forbearance and excellent editorial assistance and Dr. Fred Kiley, Director of the National Defense University Press, for his faith in this work.

I also want to thank the faculty and staff of the Escola Superior de Guerra in Rio de Janeiro and the managers at Engenheiros Especializados S.A. (Engesa) in Sao Paulo for providing me with valuable information and insights about Brazil's defense industries. Likewise, the faculty and staff at Escuela Superior de Guerra and the managers at various defense enterprises in Buenos Aires improved my understanding of the dynamics of Argentina's arms production.

Any major scholarly work inevitably takes its toll of the household. I never cease admiring the patience and moral support of my wife through these disruptive projects and always appreciate her editorial aid.

The views expressed in this book are my own. My opinions do not reflect those of the National Defense University or other federal institutions. While I profited from the advice of many informed people, I alone assume responsibility for any errors of fact or opinion on these pages.

# **ARMS INDUSTRIES: New Suppliers and Regional Security**



## SEVEN NEW ARMS SUPPLIERS IN THE WORLD MARKET

## 1. OVERVIEW

**D**uring the war in the Falkland Islands (Malvinas Islands) in 1982, the British Government sought assurances from the South Africans that they would not sell domestically produced, sea-skimming, Scorpion missiles to Argentina. The Scorpion, a variation of the Israeli Gabriel II missile, operates like the French Exocet missiles that Argentine aircraft had used with telling effect against British ships. Although, the South Africans denied any intention of making such a sale, they pointed out that because Britain participated in the international arms embargo against their country, they felt no obligation to restrict their arms trade. If the South Africans had made available such missiles to Argentina and in large quantities, the war at sea around the Falklands might have had a different history. (Since the Falklands War, Israel has sold Argentina some 50 Gabriel missiles).<sup>1</sup>

In mid-January 1983, a conference of representatives of the Nonaligned Movement, meeting in Managua, Nicaragua, denounced Israel for selling arms to Latin American countries. Thus, for the first time, the question of arms sales by other than the major producers had been raised by nonaligned nations and voiced in rhetoric against the West.

In September 1985 the United States reportedly prevented the Israelis from selling upgraded and newly armed Skyhawk aircraft to Argentina. With the memory of the Falkland Islands war fresh on their minds, the British appealed to US officials to bar the Israelis from completing this transaction. The United States has the power to stop such sales because the military equipment being exported contains US technology.

Such episodes would not have happened 30 years ago. Then four countries—the United States, Great Britain, France, and the Soviet Union—enjoyed a near monopoly of the world's arms production and export. Granted, some smaller industrialized countries like Belgium, Czechoslovakia, Sweden, and Switzerland also manufactured arms and sold them abroad; however, the big four dominated international arms traffic. Recent episodes suggest that a fundamental change in world arms production is beginning that, over time, could have important consequences for international relations and for US national security.

In their quest for economic development some countries are fashioning significant industrial capabilities. We commonly refer to these countries as "newly industrializing." This term offers an imprecise label. Some nations, like South Africa and Israel, long have had some degree of Western style manufacturing. Their industrial character is "new" only because they now not only make many more products, but these products often incorporate modern technology. Other countries, like Korea and Taiwan, are building industrial enterprises atop traditional, agrarian societies. The important point

is that the newly industrializing nations, as distinct from their older counterparts (chiefly in North America and Europe), have only recently achieved enough production to become significant factors in world trade and politics.

A number of observers are coming to the conclusion that in both civilian and military industry, with the support of Western technology, developing countries could successfully become capable of generating their own modern armaments industries, reducing reliance on foreign sources.<sup>2</sup> In some cases, newly industrializing countries are developing conventional arms production capabilities of varying size, type, and performance. Many of these nations aim to use their defense production for supplying their own armed forces and, whenever possible, for export.

To keep this matter in perspective, one should consider that newly industrializing nations represent only some of the countries engaged in arms exports. At any given time, over sixty nations are selling arms to others. For the most part these sales represent re-exports of older weapons that were previously acquired, usually from the major suppliers. A few newly industrializing countries are beginning to emerge as suppliers of indigenously produced military hardware. These new arms producers now appear in such diverse geographic areas as the Middle East, Africa, the Far East, and Latin America. This study focuses on seven of these producers—Argentina, Brazil, South Korea, Taiwan, Israel, India, and South Africa because these countries are the largest arms manufacturers in their geographic areas.

Certainly, these seven countries do not exhaust the list of arms manufacturers in the Third World. Egypt, Singapore, and other ASEAN countries, Australia, and Chile are some of the other nations that are now producing armaments. Notably absent from this volume is a discussion of defense production in the People's Republic of China, (which in 1984 sold \$1.66 billion in weapons and defense equipment, chiefly to Third World nations).<sup>3</sup>

### Points of View

This study does not address the nuclear arms question or the export of conventional arms from major suppliers to other nations, including those within the Third World. Rather, it focuses on the recent proliferation of indigenous conventional arms production in newly industrializing lands. Specifically, the question is posed: Does the spread of arsenals in newly industrializing countries have great importance for international relations in general and for *US national security interests* in particular? In assisting allied and friendly powers to acquire the knowledge associated with arms manufacturing, the United States should work toward deterring war and promoting peace through a strong defense.

Andrew Pierre argues that expanding arsenals throughout the Third World will have little effect on international arms traffic. He deplores the tendency to overstate the importance of the increasing numbers of arms producers.<sup>4</sup> Pierre implies that these new armament sources should pose no major problems for US national security decisionmakers.

On the other hand, Robert Shuey of the Congressional Research Service, and Michael T.

Klare assert that the proliferation of arms production around the world tends to make the maintenance of peace even more difficult.<sup>5</sup> The expansion of domestic arms manufacture leads to destabilizing arms races that could provoke local conflict and exacerbate already strained relations among rival nations. Moreover, such conventional arms production demands human and financial resources that the leaders of these countries could use more profitably for improving the economic and social conditions of their people.

Shuey maintains that the older arms producers, in large part, are responsible for these adverse trends because they assist the newly industrializing countries in improving their technological competence for weapons production. Klare asserts that cumulative US arms technology transfers, in addition to those of other major industrial powers, are steadily adding to the world's capacity for initiating and sustaining warfare. In sum, Pierre contends that growing arsenals can have little impact while Shuey and Klare maintain that such transfers could influence important international events in unwholesome ways.

Brazil provides a classic example of how a military item manufactured in a newly industrializing country had major consequences for a specific region. While Libya's purchase of T-54 and T-55 tanks from the Soviet Union played a key role in Libya's strike into Chad in 1981, Cascavel lightweight armored vehicles, imported from Brazil, assisted Libya's military operations. The Cascavel proved to be one of the important components of Libya's military

forces in the attempt to gain Qhadaffi's objectives in neighboring African nations.

This study, then, is designed to address broad considerations identified in the following hypothesis:

The proliferation of conventional weapons production capabilities in newly industrializing countries could have a long-term impact on regional power relationships, requiring US and other security decision-makers to develop specific policies toward these new arms-producing nations.

This study agrees with Pierre's contention that the emergence of new arms sources cannot *soon* challenge the preeminent position of the United States, Great Britain, France, West Germany, and the Soviet Union in the global arms market. It departs from Pierre's argument by contending that the production and export of arms and military equipment are having and will continue to have significant consequences globally and regionally. These armaments need not be the most technologically advanced to affect the course of international events.

### Historical Context

The concentration of arms production in the hands of a few nations represents a recent phenomenon. For many centuries military leaders expected fighting men to provide their own weapons (as did the American militias during the colonial period, for example). When fashioning spears or swords posed no greater a technical and financial burden than making a plow or hoe, military leaders could rely on this type of logistical base. The ability to make weapons was widely distributed throughout the world.

Only the coming of the Industrial Revolution, and the accompanying rise in the complexity and cost of armaments, squeezed the individual out of making or acquiring arms. Nations without an extensive industrial infrastructure could no longer supply the technology of advanced weapons on which modern war came to depend. They now needed such industrial assets as steel mills, foundries, chemical plants, and assembly factories. Not surprisingly, only those nations which built up the largest and most advanced industrial plants came to enjoy self-sufficiency in arms production.

After World War II the United States came to dominate armaments production within the non-communist world. Within the past two decades that dominance has lessened. In NATO's early years most Western European armed forces primarily used American military equipment. Independent countries in Latin America, the Far East, the Middle East, and elsewhere likewise imported much of their weapons from the United States. Within a relatively short period countries like Great Britain, France, Sweden, and West Germany broke the US monopoly. The United States came to face increasingly stiff competition in the Free World arms market. In 1970 US exports fell to about 30 percent of the world total, maintaining that level into 1985. In the first half of the 1980s arms exports by developing countries grew rapidly at an average rate of 21 percent annually, reaching a peak of \$7 billion in 1984. The important fact is that by 1985 newly industrializing countries came to account for from 5 to 9 percent of the world's total arms exports, a modest, but significant level.

Brazil and Israel are the leading arms exporters in the Third World, with almost half of exports of major weapons. Of special significance to us, Brazil and Israel account for about 80 percent of the Third World's exports of domestically produced major weapons.<sup>6</sup> Given the difficulties of tracking the arms trade throughout the world with precision, these figures represent rough but meaningful estimates of the arms transactions of concern to this study.

Two additional points deserve mention. First, there seems to be no clear relationship between arms production and export and the share of the gross national product (GNP) that a nation earmarks for military purposes. The developed world, to which all the major arms suppliers belong, spends about 5 percent of its GNP on military forces while the developing world, for the most part highly deficient in armaments production, actually devotes more to defense.

The lack of a consistent pattern also appears in the newly industrializing countries examined in this study. Of these 7 growing arms producing countries, military expenditures as a share of GNP range from a low of about 1 percent in Brazil to a high of nearly 30 percent in Israel. Even with such a small share, Brazil in 1985 exported an estimated \$3 billion in military items while Argentina exported very little. India, channeling some 3 percent of its GNP to meeting defense needs, exported only several million in military goods in 1986 while South Korea, devoting about 1 percent more of GNP for defense than India, sold an estimated \$53 billion abroad. Moreover, India spent about 2.5 times more for defense

than did South Korea. Clearly, the ability of a nation's defense industries to meet its own armed forces' needs for selected items often determines its export potential. India's armed forces simply have absorbed all the production of the country's defense industries.

In most countries the national government owns and controls defense industries. Only in the United States do private firms account for most of the military equipment used by the armed forces. Not only are most of the arms industries nationalized in newly industrializing countries, but there often is only one firm that can produce a specific weapon. Almost no competition between defense firms exists. However, within the past decade some countries have tended to accept bids from foreign companies for arms that they want to procure, stimulating some competition. Thus, the United States bought its machine guns from Belgium, and Argentina purchased missiles from Israel. In many of these cases the exporting country manufactures a better and less costly product than do the indigenous industries of the importing countries.

### Motivations

Before examining the character of defense production in seven countries, it is worthwhile to discuss briefly the reasons why newly industrializing countries opted to manufacture arms. First and foremost, most arms producing countries face some formidable threats to their survival, to their territories, or to their political independence. No one doubts

that Israel confronts acute military threats to its survival. Israel has lived under siege since its birth surrounded by those who would destroy the Jewish state.

South Korea likewise lives under a constant threat from the north while the Chinese Nationalists cannot assume that the Chinese Communists will never invade Taiwan. India has fought wars with both Pakistan and the Peoples Republic of China (PRC) and cannot entirely discount future wars. South Africa wants to possess military superiority to discourage its northern black neighbors from ever considering military actions to aid their brethren living under the deprivations of apartheid. The South African government, moreover, must forge the military capability of countering internal revolt. Argentina recently fought a war with the British over the Falkland Islands and cannot completely rule out another military confrontation in the distant future. Of the 7 countries, only Brazil has enjoyed recent peace with its neighbors.

Second, in attempting to bolster their independence and freedom of action, these countries judge greater autonomy in military hardware a potent asset. India not only maintains a powerful military force (the largest in South Asia and the fourth largest in the world), it is striving to achieve self-sufficiency in the manufacture of arms. The Indians always remember that the United States cut off arms sales and deliveries during India's wars with Pakistan in 1965 and 1971, although the US action was not as devastating as it was in the case of Pakistan.

The Argentine government claims it needs a domestic arms supply to reduce the country's dependence on others. Argentine leaders remember the

shortages that they experienced during the Falklands War. They believe that these shortages helped to bring about their defeat. Brazil's basic goal also is self-sufficiency, to be achieved by constantly increasing the local content of military goods with a possible spin-off for exports.<sup>7</sup> Taiwan, no longer certain of US support, seems to recognize that it has to depend increasingly on its own efforts to produce the military equipment that it feels it needs for survival.

The spread of arms production inevitably leads to the loss of control by former major power suppliers, including the United States, in newly industrializing countries.

The third motivating factor is that, over the years, many Third World countries have come to believe that the West, and especially the United States, has not been a reliable and consistent arms supplier. For example, Israel has always feared it might not be able to acquire needed arms. At the nation's creation in 1947 the Israelis faced an arms embargo which forced them to acquire weapons clandestinely. Weapons supply and delivery have been major issues ever since. Various US administrations have held up arms deliveries over policy issues, and France's sudden arms embargo against Israel during the Arab-Israeli War of 1967 became a turning point. The Israelis responded by determining to produce as much of their own military arms as they possibly could. Paradoxically, Israelis often jokingly refer to Charles DeGaulle as the father of Israel's armaments industry because he made the decision to cut off Israel from French arms, inducing them to strike out on their own. France has paid a heavy technological price for this embargo because, over the years, the Israelis had made major improvements in their

French weapons. Additionally, when the British interrupted the provision of spare parts for Centurian tanks during the Yom Kippur War in 1973, Israel built its own main battle tank, the Merkava.

International resolutions prohibiting nations from supplying South Africa with the means of warfare also prompted the South Africans to develop their arms industry. Above all, the 1977 United Nations Security Council's unanimous vote for a worldwide arms sales embargo convinced the South Africans that they had to manufacture their own weapons.

In the wake of the painful lessons of the Falklands War, Argentina also stressed increased domestic arms production when relations with the United States cooled over human rights issues. The Carter administration made the issue of human rights a major criterion in determining US military assistance and sales. President Carter also thought there were too many arms throughout the world and sought to limit the introduction of advanced weapons into Latin America. After President Carter refused Argentina permission to procure the Cadillac Gage V-150 "Commando" armored vehicle and the FMC M113A1 armored personnel carrier in 1977, the Argentine Army arranged to build in Argentina the West German designed Thyssen-Henschel 30-ton tanks (based on the German IFU armor with a 105mm gun and a 20mm cannon). The Brazilians also experienced a cutoff in US arms for similar human rights reasons (although Brazilians purchased most of their arms in Europe).<sup>8</sup>

Although the South Koreans are closely allied with the United States, they also push domestic

arms production to gain increased political leverage, thereby lessening the ability of the United States to exert diplomatic pressure. The Nixon Doctrine proved influential in directing the South Koreans to such a course. In 1975 a US decision to suspend the military aid program, to reduce foreign military sales credit, and a refusal to sell M60A tanks, Lance surface-to-surface missiles, and F-16 aircraft to the South Korean armed forces reinforced the Koreans' determination to build up their own defense production capability. In addition, the United States suspended production of numerous military items that it previously had supplied to the Korean armed forces. For the South Koreans, this cutoff created severe logistical problems. They sought to overcome this deficiency by establishing local maintenance facilities, producing the necessary spare parts and, in some cases, manufacturing complete items of equipment.

Taiwan, as noted, came to have less confidence in the extent of US support and decided that it, too, had to review its entire industrial structure to ensure that this supported Taiwan's strategic objectives. As early as 1971 when, with US backing, the PRC was admitted to the United Nations and Taiwan was removed, the Chinese Nationalists launched an ambitious military procurement program, aimed ultimately at nothing less than military independence from the United States and eventual self-sufficiency.

India has made great strides in achieving self-sufficiency (at least in ground warfare). Its population had the necessary skills as well as the technology and raw materials to support a relatively modern arms industry.

Similarly, indigenous arms in the hands of well-trained South African military forces should continue to be more than a match against any combination of potential enemy states that conceivably might attack them.

A fourth factor is that a defense industry, like any commercial civilian enterprise, could provide a nation with economic benefits like jobs, technical know-how, and a reduction in foreign exchange costs. One can debate whether expenditures for defense offer the most attractive way for a country to improve its economy. The fact remains that several developing countries have concluded that building defense industries offers a sensible way of contributing to economic growth. Critics argue that investing directly in civilian industries presents a more effective way of attaining prosperity.

Inasmuch as arms industries often involve more advanced technologies, newly industrializing countries establish arms manufacturing in order to acquire technological skills and know-how. Through technology transfer these countries hope to increase their pool of technically trained and skilled manpower and to improve their economic performance. Of equal importance, defense industries can help induce a developing country's limited number of skilled people not to emigrate in search of better jobs. It can help prevent migration to other countries that are able to offer these scientists, engineers, and industrial managers more opportunities for applying their skills and knowledge.

Fifthly, some nations reason that, as they have to build defense industries for national security purposes, they might as well reap economic advantages

by exporting arms. Others look to arms exports as the major reason underlying their defense production. In either case, exporting arms fits into the plans of most arms producers. Inasmuch as many of these new arm producers owe huge foreign debts, such exports bring in the foreign exchange needed for repayment purposes. National leaders in some newly industrializing countries view exports as an economic imperative. The Prime Minister of Israel, Yitzhak Shamir, has noted that, "In general, we know that countries that manufacture arms must also export arms. Otherwise, they are incapable of maintaining a weapons industry."<sup>9</sup> The outbreak of the Iran-Iraq War created a ready market for arms exports, including arms from the newly industrializing countries.

A sixth consideration is that some newly industrializing countries see the export of arms as an effective way of enhancing their influence both within their region and beyond. For example, Argentina has exhibited a national security interest in Bolivia. In pursuing its aims, Argentina has supplied La Paz with substantial amounts of military equipment, including howitzers and thousands of rounds of ammunition. Brazil has shipped arms to Honduras, enhancing its influence in Central America.

### Realism and Sufficiency

To possess true self-sufficiency a nation must be able to design all its weapons as well as to manufacture them. While the ability to manufacture weapons has spread throughout the Third World, the capacity to design them has not. For the most part, newly industrializing countries produce weapons designed by the major suppliers. Argentina's tanks,

military trucks, destroyers, submarines, counterinsurgency aircraft, light trainer aircraft, and helicopters all are of foreign design. The same can be said for Brazil's submarines, AM-X attack fighter, Xavante jet trainer, Ecureuil and Lamma helicopters, and Cobra anti-tank missiles. India has opted to produce Soviet designed aircraft, chiefly MiGs. Hindustan Aeronautics is now assembling the MiG 27 Flogger D ground attack fighter.<sup>10</sup> India is the first country after the Soviet Union itself to receive the MiG 27 design. In order to purchase the MiG 29 India dropped its plans for domestic assembly of the Mirage 2000 based on a French design. South Korea's mortars, rifles, armored cars, and fire control systems, likewise, are of foreign origin. South Africa uses an imported design for its Eland light armored car, Mirage III fighter, and Impala trainer, while Taiwan employs American designs for its F5-A fighter aircraft. Australia used a French design for its under-way replenishment ship.

As Israel was designing and developing the Lavi aircraft, it also was importing F-15 and F-16 aircraft from the United States. In addition, the Israelis had to depend on US sources for major parts of the Lavi airplane, which was later canceled. Although the South Africans can supply almost all of their ground weapons, they still have to buy airframes from France and other countries. To some degree, all the newly industrializing countries experience similar difficulties.

As long as countries like the United States, Great Britain, and France continue vigorous defense R&D programs, the newly industrializing nations will find they lack the resources to catch up. For the

most part, newly industrializing nations will continue to manufacture weapons whose designs originated in Western countries. Some of these recently advanced countries could produce a limited number of military items, but they encounter major barriers to designing and building a full range of the advanced weapons associated with modern warfare.

Some newly industrializing countries however, are now manufacturing mostly middle-technology weapons and equipment of their own design. For example, the Israelis design much of their military electronics. The Galil and Uzi small arms have an international reputation and the Merkava tank proved itself during the war in Lebanon. The Gabriel surface-to-surface missile has won world acclaim and several nations have bought this weapon. The Brazilian firm, Engesa, is responsible for designing and producing the Cascavel armored car, and the Urutu personnel carrier, which proved of great value to the Iraqis in their war against Iran.

Middle technology arms from newly industrializing countries can play a critical role in military operations. For the most part, the weapons containing the highest technology relate to air warfare while the ground forces seem to make do more often with middle and low technology weapons. In some cases the air war could become relatively unimportant to the conflict on the ground. Consequently, a nation producing effective middle level military technologies for ground warfare could achieve military objectives even if the enemy had available high technology air weapons. The inability of Third World countries to produce indigenous high technology air warfare items might not appear too worrisome—as long as a

fighting force has sound ground weapons—including an anti-aircraft system.

Although newly industrializing nations probably cannot achieve complete self-sufficiency, by providing their armed forces with a good deal of low and middle technology weapons, they can reduce the degree of dependence on others, especially for spare parts and training. After World War II, as the only major exporter of weapons, the United States could, by controlling the flow of spares and ammunition, determine the duration of any conflict that recipient countries might wage. The Pakistanis discovered this unpleasant fact the hard way. In 1962 Pakistan attacked India, a conflict unwelcome to the United States. India depended little on arms from the United States while Pakistan's forces operated almost totally with US military equipment. The United States imposed an embargo on both sides, an action that had little impact on India, but which had a devastating effect on Pakistan. As its spare parts and other military equipment were used up, Pakistan's attack came to a premature halt, preventing the Pakistanis from attaining their objectives. The Pakistanis never forgot this incident and other nations took note.

South Africa has conducted prolonged military operations against rebel forces in both Namibia and Angola. Had South Africans continued to depend on others for their arms, they might have been forced to curtail or cease these military operations when the major suppliers decided to heed the United Nations call for an arms embargo against them.<sup>11</sup> Very clearly, the degree to which the new arms makers

can attain freedom of action, in both military and political terms, in part depends on their ability to produce their own arms.

In summary, within the last decade or two the world has witnessed the growth of arms industries in newly industrializing nations. Although in the foreseeable future the spread of arsenals most likely will not alter dramatically the distribution of power among the nations of the world, it still can influence critically the outcomes of regional and, even at times, global events. The newly industrializing countries have opted to establish and expand their defense industries for 6 main reasons: to counter threats against them, to gain more freedom of action; to provide a hedge against what they believe is the unreliability of the established major arms suppliers; to gain economic and technological benefits through technology transfers; to strengthen their arms export trade; and to expand their political influence.

In reviewing the effects of the developing armaments industry it is important to recognize that, in the finite sense, the future security of the United States may be linked to the abilities of friends or enemies who can either help or harm us by their capacity to produce weapons on a sizable scale.

## 2. ARGENTINA AND BRAZIL

**A**rgentina has attempted to increase indigenous arms manufacturing in a major way. Because Argentina confronts what it considers to be serious international controversies, it remains especially sensitive to the status of its military power. Despite their defeat in the Falkland Islands (Malvinas) war, Argentinians put great store on their military prowess. One Argentine proudly wrote, "Argentina has proved that it can put the world's number three military power in a tight spot not to mention that the latter was helped by the world's number one military power."<sup>1</sup>

This attitude underscores Argentina's determination to do what it can within the country's technological and economic limitations to fashion and augment its own arms industry. It seems committed to increasing arms self-reliance so that potential policy differences with foreign arms exporting countries will never again deny Argentina the military equipment it needs, as happened in the Falkland Islands war.

### Historical Background

After World War II many people considered Argentina as the development model for all South

America. It enjoyed natural riches and had a relatively high cultural and technological potential. During the regime of Juan Peron, the government emphasized nationalistic policies which, among other objectives, were designed to avoid dependence on foreign military assistance. At that time it created a large, overstaffed, and highly inefficient domestic arms supply organization. The Argentines simply lacked the technical and managerial expertise to ensure a productive arms enterprise. In addition, the government often assigned to its arsenals military officers with great longevity or political connections rather than those with industrial expertise.

By the early 1970s the Argentine armed forces were equipped mostly with foreign-procured weapons. Argentina had to use its resources in combatting the rise of armed and unarmed anti-government dissidents. During this period, Argentina's traditional rival, Brazil, succeeded in building up a formidable defense production capability.<sup>2</sup> The 1973 return of Juan Peron, the domestic turmoil following his death, his wife's assumption of the presidency, and the intensification of potent anti-government activities caused the military to delay proceeding rigorously with the build-up of a domestic arms industry. By the time the military had overthrown Isabel Peron's government in 1976 and defeated the insurgency in 1977, relations with the United States had cooled over human rights violations. The United States could not supply Argentina with military aid while thousands of Argentine citizens disappeared mysteriously and reportedly were subjected to torture and murder.

While recovering from the Falklands war, Argentine leaders closely watched the growth of Brazil's arms industry. Although the new democratic government severely reduced the defense budget, government leaders recognized the long-term need to improve the country's defense industrial base. However, in the years following the war, the country first had to replenish losses, forcing Argentina to buy foreign weapons rather than to channel available funds into building up the domestic industrial base. The Argentine Air Force replaced the lost Mirages by importing 19 Mirage 3Cs and 3 Mirage Ds from Israel which is re-equipping its air force with newer American fighter aircraft. Only after foreign imports have met the force goals of the country's military, will Argentina likely allocate more of its resources to improving its own domestic arms industry.

### Defense Industries<sup>3</sup>

In comparison with other major arms producing nations, Argentina's defense industry consumes only about 0.9 percent of its GNP. In terms of indigenous designs, the country can produce limited quantities of mostly unsophisticated materiel. It remains heavily dependent on foreign licensing arrangements for the production, including the management, of advanced weaponry. Nonetheless, Argentina conducts a broad range of defense manufacturing programs, including tactical and trainer aircraft, anti-tank missiles, submarines, frigates, light armed vehicles, tanks, ammunition, and small arms. It has made efforts to produce greater quantities of arms and to improve their quality.

Before the military relinquished political power in 1984 to a civilian government, the Argentine government owned and controlled most military production and research organizations. The military and the Ministry of Defense ran about 80 percent of the country's arms industry. In fact, so entrenched were the armed forces, that the defense industry came to be called the "old boys' club" of the military. Private enterprise participated only to a very limited degree. However, in recent years Argentina has taken steps to shift the status of *Fabrica Militar de Aviones* (FMA), Argentina's largest aircraft enterprise, from being a component of the Air Force's materiel command to a private company.

To acquire weapons for its ground forces in 1941, Argentina created the totally autonomous *Direccion General de Fabricantes Militar* (Directorate General of Military Production) (FM) which directs the production of military goods. In the early 1960s FM produced the TAM (*Tanque Argentino Mediano*), a medium tank. The TAM, based on the design of the West German "Marder" mechanized infantry combat vehicle, is armed with a 105mm cannon, 2 machine guns (one coaxial), and a smoke grenade launcher. Thyssen's (*Thyssen Nordseewerke*) of West Germany supplies some of the tank's design as well as special steel, and Argentina manufactures both the cannon and the turret locally. Recent versions of the Model 177, 155mm towed-howitzer cannon are entirely of Argentine design. FM also produces pistols, 20mm and 40mm ammunition, fuses, explosives, 120mm mortars, 35mm cannon, and other items used by the ground forces.

The government owns and manages the major shipyards which construct and assemble naval vessels. The Ministry of Defense controls the AFNE shipyard in La Plata; the Argentine Navy and Ministry of Public Works operate the new Domecq Garcia shipyard in Buenos Aires. The La Plata yard also engages in commercial activities, including the building and repairing of merchant ships.<sup>4</sup> Argentina's indigenously designed ships are relatively small and unsophisticated. The Navy has to rely on foreign technical aid to produce major naval vessels. For example, West German technical assistance is helping Argentina to construct submarines.<sup>5</sup> At its Domecq Garcia shipyard Argentina is building submarines under license from the West German Thyssen Nordseewerke. West Germany also has helped Argentina produce *Meko* 140 class frigates which carry Exocet missiles, torpedoes, and helicopters.<sup>6</sup> There appears to be no significant program of follow-on naval construction.

Argentina's small aerospace industry is striving to become internationally competitive. The development and production of military aircraft have been the chief responsibility of Fabrica Militia de Aviones (FMA), one of two components of the Area de Material Cordoba, a division of the Argentine Air Force. The industry's capability is focused on designing and producing simple, light aircraft. The industry has the ability to build a variety of such aircraft, including general purpose (utility) airplanes. It co-produces light military (training) aircraft domestically under license from US firms such as Cessna and Piper. Argentina is now working with Brazil to design and produce a small transport. Argentina is second only to Brazil among South America's aircraft producers.

As in the case of ground equipment, Argentina established its aerospace industry by tapping foreign technology and management assistance. West Germany's Dornier has helped Argentina in its efforts to produce a new 1A-63 tactical fighter.<sup>7</sup> The 1A-63 was to be an efficient, inexpensive fighter that would prove an attractive export item. It was envisioned that the fighter would be constructed from components built in Argentina and possibly would have a US-built Garrett engine. The 1A-63 was supposed to have the performance of an "Alpha Jet" aircraft, but cost half as much. Argentina has built some prototypes of this aircraft, but has not started production of the plane. The Argentine military had hoped to begin by building a 1A-63 jet trainer and then converting it to a fighter for use by the Argentine Air Force in the 1990s.<sup>8</sup>

Argentina also is pursuing indigenous aerospace developments. It focuses most of its efforts on fashioning a new version of its own 2-seat 1A-58 Pucara light tactical support aircraft powered by turboprop propulsion system. It no longer produces the 1A-58 Pucara but reportedly anticipates going into production with Pucara B and C models in the near future.<sup>9</sup> By 1986, 70 Pucara A aircraft had been manufactured. FMA began producing the Pucara B in 1981 and a single seat version was expected to fly by 1985.

The Instituto de Investigaciones Cientificas y Sienicas de los Fuerzos Armados, CITEFA, conducts indigenous research and development of weapons and other equipment required by the armed forces. Although most weapons produced domestically are of foreign design, CITEFA has the task of developing

an indigenous missile production and space research capability. It already has developed an air-to-surface missile (ASM) and an antitank guided missile (ATGM). CITEFA also has designed artillery-launched two-stage rockets. These projects give Argentina valuable experience in missile design, testing, and manufacture.<sup>10</sup>

### Exports

Thus far, the arms industry of Argentina has exported relatively few military items abroad. It has sold some of its military hardware to such countries as Bolivia, Paraguay, Peru, and Uruguay, all close neighbors. Additional items have turned up in El Salvador, Honduras, and Nicaragua. Argentina has faced delays in carrying out its plan to export the indigenously designed and produced TAM medium tank. The country plans to produce some 1,500 TAMs, five times as many as the Argentine army would require. No doubt, the remaining TAMs are earmarked for export. Manufacturing delays have resulted in irregular deliveries of German components. For their part, the Germans express dissatisfaction with Argentina's TAM export plans.

Within recent years Argentine efforts to sell its 1A-58 Pucara aircraft have begun to show results. Uruguay has imported five of these aircraft. Argentina's defense firms also have exported more than 10,000 units of the Albatross unguided tactical rocket for use in antisubmarine naval warfare. Within the present decade it is estimated that Argentina will face more intense competition from Brazil and Chile in the international market for the sale of trainer and attack aircraft. The Argentines can manage only

short production runs, thus, the price of Argentine equipment tends to be high.<sup>11</sup>

A lack of good program managers has plagued Argentina's efforts to export arms. Production delays and bottlenecks interfere with the Argentine industry's ability to meet schedules, resulting in a poor reputation in the international market. This deficiency has caused potential buyers to delay or decide against importing Argentine weapons and military equipment. Yet, the country's defense industry suffers more from an inability to keep pace with the volume of orders received than from an excess of unused production capacity.

\* \* \*

**T**he Brazilian government was taken over in 1964 by the military to ensure internal security and, according to military statements, to resolve political and economic problems that had reached a crisis state. The military believed that industrialization constituted the key to the nation's economic progress and to achieving the country's domestic and foreign objectives. Despite some challenges and internal conflicts, the military spread its control across the country.<sup>12</sup>

The fact that by 1968-1970, the economy had recovered from its stagnation and had one of the fastest growth rates in Latin America

reinforced the military's confidence in their ability to guide the economy.<sup>13</sup>

From 1968 to 1974 Brazil's annual growth of real GNP averaged some 10 percent. These prosperous years, known as the "Brazilian Miracle," ended because Brazil, like many other countries, suffered from the massive oil price increases demanded by OPEC nations. The need to pay for enormous amounts of oil imports, led to a significant balance-of-payments deficit and a substantial foreign debt.<sup>14</sup> Specifically, Brazil came to owe the world's second largest debt, some \$80 billion. In the early 1980s the devaluation of the cruzeiro appears to have led to a reduction in army spending, and this resulted in delayed production of the air-to-air Piranha missile.<sup>15</sup>

The Brazilian military arrived at a consensus with the leaders of industry and agriculture toward the goal of working for Brazilian "greatness," an idea that has become part of the Brazilian psyche. The private sector, despite some misgivings about military rule, saw the military strength as a bulwark against guerrilla threats and labor unrest.<sup>16</sup> The current civilian government has continued to work for these same objectives but intends to build democratic institutions to replace the authoritative political style of the military. The military establishment itself saw the need for ending military rule and promoted rather than resisted the transfer of power to civilians.

### Defense Industries

From 1967 to 1976 Brazil imported some of its arms from the United States. As in the case of Argentina, President Carter's policy toward Brazil,

stressing human rights violations and discounting the idea that Latin America needed advanced weapons, led him to discourage US arms exports to Brazil. Although Brazil did not rely on the United States for most of its arms, the Carter action convinced Brazilian leaders that they should become independent in defense production.

In 1977 Brazil formally severed its arms relationship with the United States and turned vigorously to domestic production as well as to importing technology from Western Europe under licensing and co-production arrangements. Employing a mixture of private and government collaboration, Brazil orchestrated an aggressive program to build up its own defense industry. Although 20 years ago Brazil acquired most of its weapons abroad, today about 75 percent is manufactured within the country. Brazil has progressed to the point of designing and manufacturing a host of military items like wheeled armored vehicles, turboprop trainers, rockets, rifles, missiles, tanks, bombs, ammunition, military communications equipment, and computers.

In March 1984 Brazil and the United States signed a Memorandum of Understanding (MOU) which called for military cooperation between the two countries. Thus, President Reagan adopted a new US policy toward Brazil. He reversed President Carter's policy of denying arms, replacing it with a policy encouraging, or at least not interfering with joint efforts in arms production. This MOU did not sit well with certain elements of Brazil's military, political, and industrial leadership. General Danilo Venturi, a top aide of Brazil's president at the time

and the Secretary General of Brazil's National Security Council, expressed dissatisfaction with this MOU. He worried that the United States might prevent Brazil from selling weapons to one of its best customers, Libya; that it might preclude further sales of the improved vehicle, the Cascavel, to important customers; and, would obstruct modernization of the Navy. He was joined by Jose Luiz Whitaker Ribiero, president of Engesa (a producer of armed vehicles), who was outspoken in his opposition to the MOU.

Impressive evidence of Brazil's rise as an arms producer is the growth of its aircraft industry. Today, Brazil ranks sixth among world manufacturers of aircraft. The largest aircraft manufacturer is government-owned Embraer, with annual sales totalling some \$205 million and a workforce of 5,414. It maintains a production rate of 22 aircraft per month. Col. Osires Silva, Embraer's former president, proved a dynamic force in Brazil's drive to achieve significant aircraft production.

Embraer produces a civilian and military model of the turboprop Bandeirante transport, the Xingu wide-cabin executive jet, an agriculture sprayer, and the Ipanema (a single and twin engine piston aircraft based on a Piper design). It formerly produced the Xavante jet trainer under license of Aeromacchi of Italy. Currently it is successfully producing and selling the turboprop Brasilia transport and the Tucano turboprop military trainer aircraft as well as coproducing the AM-X jet fighter together with Aeritalia and Aeromacchi. Aerotec and Neiva, 2 privately owned aircraft companies, round out the Brazilian industry's fixed-wing manufacturing capability. Aerotec

builds the Uiapura primary trainer and Neiva, a Piper manufacturer, has recently amalgamated with Embraer.

In 1978 Brazil and France formed Helbras which now assembles helicopters in Brazil.<sup>17</sup> Avibras, Brazil's aerospace firm, produces multiple rocket launching systems, the most modern being the ASTROS II. The LM 07/36 and LM 108R are low cost surface-to-surface rocket systems used for saturation purposes on the battlefield. The company has developed an anti-aircraft fire control system as well as ground-to-air missiles and Carcara television-guided air-to-surface missiles. In addition Brazil produces Cobra anti-tank missiles under license from West Germany. Brazil also is developing Piranha air-to-air missiles.<sup>18</sup>

In 1983, the Arsenal de Marinha do Rio de Janeiro celebrated its 220th anniversary. Shipbuilding suffered from the economic recession of the early 1980s, as did all Brazilian industry. However, Brazilian shipbuilding survived the economic downturn, and shows signs now of future success. Brazil now maintains the largest shipbuilding industry in Latin America. The largest shipyard is a joint venture with the Japanese; the second largest is a joint venture with The Netherlands. Esabras, a government agency, coordinates the activities of the seven largest shipyards. Brazilian naval shipyards are expected to meet all naval requirements, relying on licensing arrangements, on coproduction with foreign contractors, or on indigenously produced designs and production.

Under license from Great Britain, Brazilian shipyards produced two modern *Niteroi*-class

destroyers and are producing two German-designed diesel submarines. Brazil expects to begin building a nuclear submarine by the mid-1990s.<sup>19</sup> The yards also are constructing 4 corvettes which will bring the industry more prestige than it has ever had. The corvette is the first warship program to reach the construction stage. The Brazilians are also building a tanker and several small patrol boats.

In supplying military hardware for the ground forces, Engenheiros Especializados SA. (Engesa) stands out as a major source of army weapons. Jose Luiz Whitaker Ribiero founded the company some 13 years ago. Engesa builds both wheeled and tracked military vehicles. It manufactures the Cascavel armored car, the Urutu armored personnel carrier, and the Jararaca scout car. Engesa sold the Cascavel and Urutu to Iraq. The two Brazilian weapons showed what they could do under actual combat conditions in the Iran-Iraq War where they proved effective and dependable on the battlefield. News of their excellent performance quickly spread throughout the Middle East and to other areas as well. As Whitaker Ribiero has said, "What really sells your product is to have it proved in actual fighting."<sup>20</sup> As orders poured in, Engesa built up rapidly. Today, the company has 14 subsidiaries and 10,000 workers. It produces armored cars, trucks, a tank destroyer, a 90mm gun and turret, and a tank. In addition, the firm manufactures armor plate, guns, ammunition, electronic instruments, and laser-guided missiles.

In targeting the Third World for arms sales, Engesa has tried to keep its military hardware inexpensive and simple. In addition, Engesa, for the most

part, manufactures weapons utilizing middle technology. Simple designs have led to reduced costs and greater dependability. Engesa proved that sales of middle technology arms to Third World countries could flourish because these developing countries, by and large, do not require the most advanced technology in their weapons.

Engesa recently came out with the 35-ton Osorio tank, powered by a diesel turbine engine and attaining a speed of 44 miles per hour. The company plans to equip this tank initially with a 100mm gun and in later models replace this with the 120mm gun. Spokesmen for the firm claim that the Osorio packs the same firepower and costs much less than the US M-1 Abrams tank. Furthermore, its supporters claim that the Osorio is easier to operate and to maintain than the M-1. How this tank would fare in actual combat against the heavier US tank cannot be proved without a contest under simulated or actual wartime conditions. The development of the Osorio marks a milestone in the history of Brazil's defense industry; this tank is its first military vehicle equipped with tracks instead of wheels. Engesa also has under full-scale development the X-30 tank which it specifically designed for the climatic and topographical conditions of countries in South and Central America. The X-30 is particularly well suited for operations at the higher altitudes which exist in many Latin American countries.

For years Brazil has produced explosives, small arms, and ammunition. In 1975 the government established a company called IMBEL to "absorb" all existing arms companies, coordinate private production of war materials, and oversee private and

public investment in the arms industry.<sup>21</sup> The government attempted to organize and orchestrate the network of various arms suppliers and subsidiaries toward common industry goals.

In the electronics and communications fields, Brazil has a number of firms producing military equipment, particularly radios and basic communications devices. For sophisticated equipment and expertise, Brazil imports foreign know-how. For example, under license from the French company, Thomson CS, Brazil is constructing a French-designed air traffic control and an air defense radar system to cover the entire country. In addition, Brazil plans a communications satellite and earth station, using foreign technology and assistance. The Brazilian subsidiary of a British firm will act as a prime contractor for the installation of fire control, information, and surveillance electronics for the 4 corvettes that Brazil is building. Brazilian firms are now moving into higher technology areas and laying the foundation for greater sophistication.

However, to achieve the modernization that they desire, Brazilian leaders still have to import some defense products. Thus, Brazil continues to be a major importer of military hardware. For example, it imported 9 LYNX helicopters, 4 *Niteroi*-class destroyers, 3 *Oberon*-class submarines, and Seacat antisubmarine missiles from Great Britain; 4 Mirage aircraft and Exocet surface-to-surface missiles from France; Ikara anti-aircraft missiles from Australia; and 2 coastal minesweepers from West Germany. Most of these procurement actions took place by the late 1970s and it is unlikely that Brazil ever again will make such purchases abroad.

In building its own defense industry, Brazil depended progressively on more domestic content of arms. It would only import arms if no local supplier existed. Brazil has proven very successful at acquiring technology (know-how) through its imports, using licensing and subsequent Brazilian production. Local content laws with the local content now up to 90 percent helped to reinforce Brazil's drive to attain self-sufficiency.

Brazil's ambitious undertakings in defense production can count on a large and growing research and development effort, targeted on gaining the technology, technical knowledge, and skills found in advanced industrialized countries.

### Exports

Brazil certainly has embarked on a defense production course that takes the country well beyond modernizing its own forces. Brazil's growing arms manufacturing capacity, its increasing technological competence and, especially important for this discussion, its expanding exports of military equipment coupled with aggressive marketing, reflect the country's goal to become a competitive force in the world's arms market. In its major marketing efforts, Brazil targeted the Middle East, Southeast Asia, and Africa.

Brazil has been able to expand its export trade because many nations have come to believe that Brazilian arms are of high quality, great diversity, simplicity, and low cost. In addition, Brazil places no restrictions on exports (as the United States does) such as prohibiting the buyer to resell to a third

country without Brazil's permission. Brazil at present exports military aircraft, helicopters, artillery, military vehicles, rockets, small arms, all types of munitions, and naval aircraft.

Embraer's Bandeirante transport aircraft have proved a popular sales item. Guyana and Chile have bought some, as have some feeder airlines in the United States. France has ordered the Xingu light transport, Chile has taken delivery of Neiva's N622 universal trainer, and Bolivia and Paraguay have contracted for Aerotec's Uirapura trainer. The Tucano is Brazil's biggest military export item. In March 1985 the British Royal Air Force designated the Tucano as its next generation trainer.<sup>22</sup> Brazil is negotiating with the People's Republic of China for the licensed production of 2,000 Tucano units and Canada and Sri Lanka also are considering purchasing the Tucano.<sup>23</sup> These sales, however, are more doubtful than exports to Great Britain.

By the end of 1982 Embraer officials had toured more than 14 countries in Europe and Africa to market their aircraft.<sup>24</sup> At the Riomar 1979 International Maritime Exhibition, Brazil exhibited its naval and maritime expertise and reported the completion of 7 ships and contracts for 29 additional ships from foreign investors. At the close of the exhibit, Brazil had gathered 17 additional contracts valued at \$450 million.<sup>25</sup>

As previously noted, Brazil's line of armed vehicles (Jararca, Cascavel, and Urutu) have proven especially popular. Iraq reportedly purchased some 1,500 trucks and a number of armored vehicles. Libya, Qatar, United Arab Republic, Guyana, Bolivia, and Columbia also have purchased vehicles from Engesa.<sup>26</sup>

In 1985 Brazil reportedly was near to concluding a \$900 million transaction with the PRC for the sale of 60,000 light trucks during the next ten years. Brazil will transfer all the technology associated with this truck to China.<sup>27</sup>

### 3. INDIA AND ISRAEL

India's military defeat in October 1962, some 15 years after achieving independence, at the hands of the Communist Chinese led to a fundamental change in India's defense policies. Before 1962 India worried only about its traditional enemy, Pakistan. The country's leaders judged nonalignment and diplomatic efforts adequate for protecting India's other security interests.<sup>1</sup> This two-front threat required the Indians to increase emphasis on defense planning, developing a strengthened military establishment, and building an advanced defense industrial base. Throughout the years since 1962, the Indians have continued to give these three objectives a high priority. They came to realize that a policy of nonalignment still requires a strong military.<sup>2</sup>

India's military assessment now turns on what India thinks it can or cannot produce domestically and where it will seek imported weapons. India has given considerable priority to developing the technology and skilled manpower it needs to support a vigorous R&D program. The country ranks eighth in the world in the number of papers published in all areas of science and technology.<sup>3</sup>

India has been developing a launch vehicle to further its space program.<sup>4</sup> According to the Indians, the activities of both its nuclear and space development are not part of India's defense effort and are not included in India's defense budget. Nevertheless, both nuclear weapons and ballistic missiles lie within India's capability if the country makes a determined effort to fashion them.<sup>5</sup>

India has succeeded in implementing much of its defense policies, maintaining a potent military force (the largest in South Asia and the fourth largest in the world).<sup>6</sup> It supplies its armed forces chiefly from domestic production, importing only sophisticated weapons or components. India is now the dominant power in the region. This domination enabled the Indians to intervene militarily in the Bangladesh crisis of 1971, achieving the dismemberment and weakening of Pakistan, its chief rival on the subcontinent.

India has served notice that its Navy will become a "blue water" force. India is one of the few nations of the world which possesses an aircraft carrier. It has bought 2 submarines from West Germany to replace its aging Soviet-built submarines. In building its naval strength, India serves its security interests of protecting the lines of communication with the Andaman and Nicobar islands; protecting the maritime fleet, offshore oil, gas, and deep sea mining possibilities; and countering Pakistan's naval forces. In addition to building its naval power, India has taken the lead in the region in attempting to exclude outside military forces from the area by labeling the Indian Ocean a "peace zone."

Since 1962 India has experienced a steady expansion in its indigenous arms industries.<sup>7</sup> Domestic arms production remains an integral part of the country's overall defense plan. This calls on India to increase technological and production know-how and standardization in order to ease maintenance, provide a more reliable spare parts supply, ensure more freedom from threats of arms embargoes, and make more options available during a military crisis or war. For example, better maintenance and a more reliable spare parts supply would enable India's armed forces to enjoy greater sustainability.

The desire of India for regional air superiority has prompted it to produce, under license, foreign weapons designs. It also has launched native design efforts. For example, India signed an agreement with France to buy 40 of the advanced Mirage 2000s and to build 60 to 70 more in India under license. This transaction was promoted by India's desire to diversify the sources of its military aircraft. (In 1986 India abided by its commitment to purchase these Mirages, but dropped plans to build any under license in India, preferring to rely on MiG production.<sup>8</sup>) At the same time, India produces the Kiran jet trainer with indigenous technology. India also purchased Exocet missiles from France and Sea King helicopters from the United Kingdom.

While significant, India's efforts and accomplishments in defense production since 1962 have posed problems. The Indians believe that because the United States provides arms, such as the F-16, to Pakistan, it contributes to tension between the two neighbors.<sup>9</sup> India's agreement for arms assistance

with the Soviet Union has helped sour its relations with the United States

The Soviets have become India's major supplier of arms, both through sales on favorable terms and through licensed production agreements. Furthermore, India has either defended or refrained from criticizing Soviet actions. India's unwillingness to denounce Soviet intervention in Afghanistan conflicted sharply with the efforts of the United States and others to achieve a Soviet withdrawal. In addition, Indian and Soviet interests coincide on a number of policy objectives. They both want to limit the influence of the People's Republic of China in the region and to restrict the use of the Indian Ocean by outside naval forces. Moreover, both share a suspicion of the Islamic bloc, particularly Pakistan.<sup>10</sup>

Soviet weaponry is a very attractive item because the Soviets offer their arms at about a third the price of Western arms. The Russians supplied India with the T-22 battle tanks to replace the Vijayanta tank.<sup>11</sup> Eventually, the T-22 may be replaced by the more modern T-80 tank. India also bought MiG-29 fighter aircraft as well as Ilushin transports and An-26 small transports.<sup>12</sup> India also has depended on Soviet missiles, buying just enough from Western sources to avoid total dependence on the USSR. As to Army equipment, India's BMP armored vehicles are equipped with Soviet Saggers anti-tank missiles. India's air defense presently relies heavily on Soviet ground-based air defense missiles such as the SA-6, and India will acquire the SA-8 missile and the new SA-11 missile.

India has begun to feel uneasy about the extent of its dependence on the Soviet Union for its arms

and recently sought to diversify its purchases by importing aircraft from France, jet aircraft and helicopters from Great Britain, and submarines from West Germany. Because of a recent MOU between the United States and India, the Indians could seek some arms from US defense industries. This MOU eased control of technology transfer, a step that made the agreement attractive to the Indians. The Indians are interested in buying anti-tank Tow-2 missiles, and self-propelled 155mm howitzers.<sup>13</sup> For their part, the Soviets reportedly have voiced concerns about India's military procurement diversification.<sup>14</sup>

#### Defense Industries<sup>15</sup>

Indian efforts to develop its arms industry and military forces compete for resources with the country's development plans. Policymakers worry that expenses associated with defense activities will siphon funds away from economic growth and from improving the well-being of its population. Consequently, the government allocates a small share of its budget and of the country's GNP to defense. Except for the year following the 1962 Sino-Indian war, when defense spending reached some 4.5 percent of the GNP, the Indians have devoted only some 3 percent of GNP to defense (as noted in Chapter 1). These figures show that, although defense spending is important, it consumes only a small portion of the country's total resources.

India's defense production base is large, not only by developing world standards, but even by the standards of the advanced countries. It consists of 33 ordnance factories, 9 public sector undertakings,

and 34 major R&D organizations, all owned by the national government.

According to one analyst, India's defense industrial base is at a turning point. India hopes to acquire higher technology from its arms transaction. The country still has to decide on an appropriate strategy for acquiring this technology. In addition, because its defense industries have not operated at full capacity, costs have increased.<sup>16</sup>

The Indians have found that the goal of producing indigenous military aircraft confronts them with a demanding challenge. India initially copied models of aircraft developed in the advanced industrialized states, and later moved to generating a new aircraft design of domestic vintage. HAL has manufactured the British Gnat jet fighter and has assembled some 45 British Jaguar fighters. HAL also has assembled and produced Soviet MiG-21 fighter aircraft, as well as manufacturing the low-cost Ajeet jet fighters and the Ajeet II jet trainers. The Russians have offered coproduction of MiG-27, MiG-29, and even MiG-31 aircraft. The Soviet MiG-29 deal marks the Soviets' first sale of the plane to another country.<sup>17</sup>

India also is striving to manufacture locally its own aircraft engines. The Indians are producing the British Rolls Royce Adour jet engine. In addition, the Indians have announced the development of a locally designed new engine, the GTX, which gives a better performance in hot climates.<sup>18</sup> HAL produces the Orpheus turbojet engine for use in the Ajeet trainer. Under license from the Soviet Union, the Indians are manufacturing the Tumansky R-25 for the MiG 21 fighter and the Tumansky R29 for the MiG 27.

The Indians have made progress in producing helicopters, missiles, and drones. HAL has signed an agreement with Messerschmitt-Boelkow-Blohm for developing a new multipurpose helicopter called the Advanced Light Helicopter. It also produces the Cheetah and the Chetak, both licensed from France. India's drone is labeled the PTAE 7. This high performance drone will be used for training anti-aircraft crews. Although India has made it a point to import small amounts of missiles from Western countries, its aircraft generally are armed with Soviet missiles.

Relations between the arms industry and the government remain close. The Indian Constitution provides that arms production must remain in the public sector. The Congress Party, India's largest political party, traditionally has insisted on state ownership of the means of production. The Congress Party, which has held power throughout most of India's history since 1947, has made the issue a plank in its political platform since before independence. As a result, private industry produces few military items and no complete systems.<sup>19</sup>

The Ministry of Defense operates the ordnance factories and major industrial groups produce everything from ammunition to field artillery, to jet aircraft, to rocket fuel, to frigates. Allied with this industry are the Ministry's research and development facilities that study such technical matters as engines for tanks, improved radar, aircraft design, and other military hardware. India's defense production facilities supply, in monetary terms, nearly two-thirds of its military equipment.<sup>20</sup> In managing its defense industries, the Indian government aims to modernize arms manufacturing and move the

country toward self-sufficiency by reducing the need to import weapons and military equipment.

Over the years, India has followed 4 routes in acquiring weapons and military equipment needed by its armed forces. It has bought finished military products, has assembled weapons of foreign design, has modified the design of imported weapons before production to suit its purposes and, finally, has fashioned and manufactured indigenous weapons of solely indigenous design.

India has made great strides toward its goal of creating an indigenous arms industry capable of providing many of the weapons needed by its ground forces. The country has achieved virtual self-sufficiency in artillery, mortars, small arms, and mines.<sup>21</sup> The Avadi plant has built the Vijayanta tank, modeled after the British Vickers 37 MBT, although the Indian army has experienced quite a number of difficulties with the Vijayanta. However, General A.S. Vaidya, a highly decorated Indian soldier, while acknowledging troubles with the Vijayanta tank, noted that in his armored division in the war against Pakistan in 1965, the Vijayantas remained battle-worthy. He admitted that his troops had to work harder to keep these tanks effective, but his soldiers seemed willing to make this extra effort.<sup>22</sup> The Indians also have been planning to build an advanced MBT with indigenous design, development, and production that would replace the Vijayanta in the 1990s. The Indians have named this new state-of-the art tank the Arjun. The engine for this vehicle is from West Germany and, when connected to a supercharger, it will generate 1,400 hp. Reports also have circulated in India that the Army

first wanted to manufacture the Soviet T-72 tank as a stopgap measure.<sup>23</sup> More recently, the Indians seem to desire a license to build the new T-80 tank. Although the army also wants a new armored personnel carrier, it faces resource constraints because its development program consumes so much of the country's defense funds.

India's interest in naval power has enabled its shipbuilding industry to build a frigate of semi-indigenous design. As part of its deal to purchase 2 submarines from a West German company, India plans to build 2 more under license. It also has had the capability of constructing offshore patrol boats and overhauling and modernizing its aircraft carrier. Admiral R. H. Tahiliani argues that India needs a second aircraft carrier, but is incapable of designing and building one. Thus, in 1988 it purchased the British HMS Hermes.<sup>24</sup> The Indian navy already has acquired *Godavari*-class frigates and has 2 more under construction. The 700-acre Vizag naval shipyard has performed ship overhaul work on Soviet-built vessels in the Indian inventory.

Despite setbacks, Indian arms policy still aims for increased self-sufficiency. Most purchase agreements include arrangements for assembly in India of additional items and production under foreign license, with progressively increased Indian content in weapons components.<sup>25</sup>

### Exports

India has not exported arms in order to reduce the cost of home produced weapons. Arms exports never have reached 1 percent of total exports and in the late 1970s arms exports were only one-tenth of 1

percent of total exports.<sup>26</sup> Some observers believe that India is on the verge of becoming a major arms exporter.<sup>27</sup> Little available evidence exists to support this view, and information about past or pending sales remains scarce. On the other hand, as the cost of arms mount, pressure to export will increase.

It appears that HAL might enter the international aerospace market, especially to the Third World countries. Among the aircraft that it intends to sell are the Kiran Mk. 2 jet trainer and light attack aircraft, in addition to its HTT-34 turboprop basic trainer. It already has made a few sales, exporting the Chetak helicopter to the Soviet navy and to the Ethiopian air force, as well as supplying Mozambique with 10 small coastal patrol craft. Whether India will become a major arms supplier remains a moot point.

\* \* \*

**I**srael has accomplished remarkable results in achieving self-sufficiency in arms production. Fearing the possible destruction of the Jewish state, the Israelis have made national defense a first priority. They devote more resources per capita to defense than any other nation in the world, allocating over a third of their annual budget to this critical responsibility.<sup>28</sup> Yet, no matter how much Israel improves its military capabilities, it cannot attain a military victory that would subsequently ensure a permanent peace. Past victories have brought only temporary relief.

## Historical Background

Faced with a critical need to acquire arms, at first Israel purchased weapons wherever it could find them, including, in 1947, from communist countries. During the 1950s it looked to Western powers, especially to Great Britain and France, for its arms. As we have noted, the placing of an arms embargo by France during the 1967 war convinced the Israelis that they had to build up their own armaments industries. Yet, acquiring armaments from domestic sources imposed heavy economic burdens.

As early as the late 1960s, Israel achieved self-sufficiency in small arms and could produce most of its spares and ammunition requirements. Only in the Yom Kippur War of 1973, when expenditure rates grossly exceeded expectations, did Israel have to import large amounts of ammunition. Israel has developed the ability to overhaul, maintain, and repair most of its weapons, and Israeli engineers have a long history of successfully modifying weapons purchased abroad or captured on the battlefield.

In 1969, the then director of Israel's Military Industries, Yitzhak Ironi, commented that,

We have doubled manpower and tripled production since the Six Day War. We were not surprised by the extension of the French embargo in January of 1969, since we began to tool in May 1967 and have prepared dies for the most critical items. When we cannot buy abroad, we will make ourselves, and there is nothing we cannot produce in the way of arms, ammunition, and accessories in the next 12 to 15 months.<sup>29</sup>

While somewhat exaggerated, Ironi's statement generally describes the current situation. Israel presently conducts more military research and development than any other Third World country and ranks among the leaders in the production of arms.

Domestic production not only gave Israel economic benefits, but increased the country's control over its arms supply. The nation's industrial capacity also enabled its military services to adapt the military equipment of others to meet Israeli requirements. Because Israel had a substantial number of well qualified scientists, engineers, technicians, and managers, it could take the risk of relying more heavily on the local production of military items. By the 1980s Israel's defense industries led the growth in the country's manufacturing sector.

### Defense Industries<sup>31</sup>

The Office of Chief Scientist in the Ministry of Industry and Trade oversees Israel's defense industrial effort. This office bears a striking resemblance to Japan's MITI (a ministry controlling international trade). The office fomented a competitive spirit among Israel's defense industries, constantly monitoring these defense establishments to ensure their effectiveness.<sup>31</sup>

Israel's military industrial complex includes over 200 public and private firms. However, 4 government-owned companies, operating under the Ministry of Defense, dominate production. Israeli Aircraft Industries (IAI) has emerged as the largest and most important company. The company, organized in 1953 to overhaul and service aircraft of the Israeli Air Force, has become a potent economic and

diplomatic force.<sup>32</sup> Over the years it has evolved into an enterprise employing over 25,000 people (the largest employer in the country) and manufacturing over 400 different military and civilian products. Although still government-owned, IAI is now organized and operated as an independent company with a profit motive. Among other items, IAI and its subsidiaries produce aircraft, engines, radars, remotely-piloted vehicles, avionics, missile systems, fast patrol boats, and armed reconnaissance vehicles.

Some of IAI's employees came from Israel's automotive industry, but many had worked with foreign aircraft companies. Albert Schwimmer, IAI's president, served in the United States with Trans World Airlines, following his education at the Massachusetts Institute of Technology and the California Institute of Technology. The company's chief engineer, Erich Schatzki worked as an engineer at Junkers, Fokker, and Heinkel in West Germany and at Republic Aircraft Corporation in the United States. Moshe Arens, formerly the Israeli Ambassador to the United States and the Minister of Defense, served as a past president of IAI. An aeronautical engineer educated in the United States, he headed the team that developed Israel's Kfir fighter. Very likely, aircraft firms in Europe and North America supplied some personnel to IAI.<sup>33</sup> Israel also initiated efforts to train its own nationals for the aircraft industry. The country's chief technical institute, the Technion in Haifa, instituted 4-year courses to expand the size of a skilled aerospace professional force.

In the early 1960s, IAI reorganized into a number of divisions, corresponding to the various types

of specialized aeronautic technology that is used. The major divisions became engineering, aircraft manufacturing, electronics, combined technology, and Bedek (the overhaul division). Since its founding, Bedek (which means overhaul and repair in Hebrew) has inspected and overhauled military and commercial aircraft, both domestic and foreign. Until a few years ago, Israel overhauled US aircraft stationed in Europe, and the United States still ships engines of military aircraft to Israel for rework. In its operations, Bedek uses the most advanced inspection techniques and maintenance and repair methods as well as a computerized management information system. Bedek's subdivisions, responsible for airframes, engines, and components, now service some 60,000 components, accessories and systems of about 8,000 military items. IAI's manufacturing division has responsibility for aircraft production. Since its inception, this division has manufactured Magister, Ariva, Commodore, and Westwind executive jet aircraft in addition to the Kfir.

IAI's engineering division, the largest engineering establishment in Israel, employs over 2,000 graduate engineers, experienced technicians, qualified scientists, and skilled workers. They develop advanced aerospace, naval, and military systems. Sensitive to the importance of acquiring and retaining state-of-the-art technology, this division maintains an in-house, high quality independent research capability. This division also designs, develops, and tests new tri-service (air, ground, and sea) products, and initiates and conducts in-depth research as well as supplying analytical services to other industrial establishments both in Israel and abroad.

IAI's electronics division is composed of 5 subsidiary companies, including: ELTA, Electronics Industries; MBT, Weapons Systems; TAMAM, Precision Instruments; M.L.M., Systems Engineering and Integration Plant; and MAGAL, Detection and Alert Systems. This division possesses considerable potential for conceiving, designing, and producing new generations of electronic systems. As noted, its Gabriel surface-to-surface missile has received extensive, favorable publicity worldwide.

The Combined Technologies Division consists of six subsidiary firms, all certified by the aeronautical authorities of Israel, the United States, Canada, Great Britain, Switzerland, West Germany, and other nations. These companies include: Ramta, Structures and Systems; SHL, Servo Hydraulics; PLM, Precisions Mechanisms; Orlite, Engineering; Golan Industries; and Mata Helicopters.

The second major government-owned producer of military hardware and the biggest user of manpower is Israel Military Industries (IMI). The company, made up of over 20 small subsidiaries, meets over 90 percent of Israel's ammunition needs, and 100 percent of its small and medium weapon requirements. Fabrique Nationale of Belgium (FN) played an important role in developing this industry. In 1961, FN received a license to build the C-121 submachine gun (the Galil), designed by an Israeli general. In return, IMI acquired a license to build FN's 7.62mm rifle. IMI and its subsidiaries produce, in addition, mortars, heavy artillery and, since 1972, tanks.

Israel Shipyards Ltd., of Haifa, represents the third largest government-owned or controlled defense industry. The firm could employ up to 2,000

personnel. It has expanded its productive capacity by constructing floating drydocks and has enlarged its ability to repair supertankers up to 60,000 DWT. It also can build corvettes up to 1,500 tons. However, it has concentrated on building guided missile patrol boats (especially the *Reshef*) for Israeli and other Third World navies.

Probably the least known of Israel's military production organizations is the Armament Development Authority, commonly known as Rafael. This Authority prides itself in finding diverse solutions for various high technology defense problems. It has become a leader in chaff electronic countermeasures for anti-missile defense, and has designed and marketed several types of military hardware, such as the Shafrir air-to-air missile system with its combat proven 60 percent kill ratio; the David artillery computer; an analogue aircraft weapons computer; and the Tal cluster bomb.

Israel has perceived that so-called "advanced" or "high technology" weapons differ from older generation equipment in terms of the amount of electronics employed. Thus, it opted to create a strong defense electronics industry that not only satisfies much of its own needs, but also those of foreign countries. Rafael can supply radar, communications, electronic warfare, and missile guidance equipment.<sup>34</sup>

One of the largest of the private defense industries is Elbit Computers, Inc., an electronics oriented "think tank." Some time ago, Israel came to view high technology as its life-line to military and economic progress. The Israelis sought to exploit electronics to help offset massive inflation and to create

solid export markets in order to ease the import burden. In the two decades since its establishment, Elbit has gained a world-wide reputation in designing, developing, manufacturing, selling, and servicing computer-based systems and products for both military and civilian uses. It currently employs about 2,000 people. The firm describes itself as a "systems house" and 40 percent of its employees pursue engineering activities.

Founded as a joint Ministry of Defense and commercial venture, Elron Electronics Industries, Ltd., initially focused on developing military systems and producing a minicomputer, one of the first of its kind in the world. In 1977 Elbit became a public company, selling its stock on the Tel Aviv Stock Exchange. Elron or Control Data, Elbit's parent company in the United States, owns 69 percent of Elbit stock. The remaining stock is in the hands of its employees and the public.

Israelis had grandiose ambitions regarding the export of military products. Israel hopes to become an integral part of the US arms market through cooperative arrangements with US defense contractors. A 1979 Memorandum of Understanding provided the opportunity for Israeli industries to compete in the DOD arms market, brushing aside the provisions of the Buy American Act. For quite some time Israel has been selling military goods and services to the United States. It has overhauled F-4 components, leased 6 105mm guns for purchase, and provided ammunition for evaluation. Israeli firms are selling the B-300 assault weapon to the United States with a price tag of some \$300 million, as well as AN/VRC-12 radios worth \$39 million. We

already have noted that Israel has the scientific and engineering talent to build the high technology components which US weapons require. In addition, the Israelis most likely could manufacture these military items at less cost than American firms. It is their hope that, over time, US procurement managers will turn to IAI and Elbit as easily for their components as they do to General Dynamics and Raytheon (especially if Israeli subcontractors hook up with US prime contractors).

On the other hand, the United States will remain a prime supplier of advanced weapons for the Jewish state. If Israel succeeds in gaining a strong position within the US arms market, other newly industrializing allied and friendly nations certainly will try to follow suit. The American desire to soften the blow to its own defense industries and indeed to maintain a minimum level of domestic arms production most probably will limit foreign participation. Nonetheless, Israel, with its special relationship to the United States, most likely is pointing the way to future arms transactions between the United States and newly industrializing countries.

### Arms Developments

One cannot but be impressed with the wide range of high technology items that Israel's industries and laboratories are producing. The Gabriel surface-to-surface missile system became the first combat tested sea skimmer in the world. IAI developed three versions: the MKI with a range of 20 kms; the MKL with a range of 40 kms; and the 36 km-range MK3 with an active radar seeker, replacing the

semi-active homing unit carried in MKs 1 and 2. Another successful Israeli-designed missile is the Shafir air-to-air missile. In developing this missile, Rafael chiefly employed reverse engineering of the US Sidewinder missile and copied some features of Soviet missiles.

IAI has produced Israeli-designed aircraft. The C-2 version of the Kfir fighter represents a marriage of the beauty of the French Mirage III airframe and the power of the US J-79 (Phantom) engine.<sup>35</sup> This Israeli borrowing of French and American designs has caused some critics to question Israeli design capabilities. However, enough of this aircraft was the result of Israeli ingenuity (especially the electronics), that the Israelis can rightfully call it their design. Tested over Lebanon in 1982 this fighter proved combat-effective. The Kfir is a two-seater fighter which the Israelis believe has proven an ideal solution to the demands of modern air combat. The C-2 Kfir performs a multi-mission role and has the capability of meeting present and projected requirements for air combat, point defense, and ground support missions for less than \$6 million per aircraft.<sup>36</sup>

The Israelis also undertook a major project to build their own lightweight, multi-role Lavi (meaning lion) fighter aircraft. The Lavi had swept wings and advanced composite materials. This aircraft was to replace the A-4 and Kfir fighters and became a symbol of national pride.<sup>37</sup> Over time, the Lavi became a very controversial project. The US government departed from established policy by allowing the Israelis to spend \$1.0 billion within Israel in developing this fighter aircraft. US critics complained that the United States was subsidizing a competitor

in the international arms market, that the cost of the plane had skyrocketed to \$22 million per aircraft, and that F-16s would serve as well. High ranking military critics within Israel charged that the plane was eating up too much of the total defense budget. After much acrimonious debate, the Israeli cabinet decided to cancel the project and the United States agreed to allow Israel to coproduce the F-16 and offered to support more modest Israeli high technology arms projects.

The Arava, a rugged and versatile transport aircraft of Israeli design, can be used for both civilian and military purposes. In its military role, the aircraft performs missions that helicopters and conventional aircraft cannot accomplish effectively. Arava can transport 24 fully armed troops, 18 paratroopers, 20 passengers, or 12 stretcher cases. It has been called "a flying pack mule" which can carry awkward loads up to 2.3 tons. Israel also has manufactured the Westwind transport aircraft. IAI considers this aircraft as a leading contender in the corporate jet market. The Israeli Navy uses a Sea Scan variant of the Arava for performing maritime reconnaissance and for over-the-horizon targeting.

The Israelis have produced some excellent electronic equipment related to aircraft. For example, the EL/M-2215 airport surveillance radar, a modern state-of-the-art device, helps control the airspace in the vicinity of major airports.

Israel has not neglected designing weapons for the ground forces. IMI takes pride in the development of the Merkava (Chariot) tank, designed to meet Israel's particular combat requirements as

demonstrated during the 1973 war. Israeli tank developers proudly point to their significant achievement in building from scratch the industrial infrastructure (especially in metal working) required to support the construction of this tank and its outstanding armor protection. The Merkava proved to be an effective fighting vehicle during the 1982 Lebanese War.

The Israelis believe that their multi-mission infantry support vehicle, the RAM V-1 Scout Car, is ideal for tank hunting with its 106mm recoilless gun. To them it provides an excellent weapon platform for anti-aircraft defense with its 20mm cannon. Ground forces use this vehicle extensively for long reconnaissance, command and control, riot control, and border patrol. The Israelis learned a bitter lesson from the 1973 War. A lack of field artillery contributed in a major way to the high losses that Israeli armored forces sustained during the early days of the conflict. The Soltam Corporation, a leading producer of artillery pieces, has come up with some of the most popular Israeli designs, including the M-71 155mm gun/howitzer and the L-33 self-propelled 155mm gun/howitzer. Moreover, Israel enjoys a world-wide reputation as a builder of small arms. Israel's IMI produced the famous UZI 9mm submachine gun, the Galil 5.56mm/7.62 assault rifle, and all smaller arms ammunitions from 5.56mm through 50 caliber.

While Israel has not given its Navy the highest priority, it has, nonetheless, built naval ships. Israeli Shipyards, as noted, produced the *Reshef*-class and follow-on *Alyia*-class guided missile patrol craft. The *Reshef*, with its Gabriel missile proved highly effective in combat during the War of 1973. The *Alyia*

maintains a helicopter recovery capability, having landing and hangar facilities. In addition, the *Alyia* enjoys significant firepower, including Gabriel and Harpoon surface-to-surface missiles.

### Exports

Israel recognizes the vital necessity for exporting the wide range of its defense goods and services if it wishes to maintain a competitive state-of-the-art defense industry. In fact, Israeli defense industries generally export over 50 percent of domestic arms production. Israel's exports of military items have gone to Bolivia, Burma, Chile, Dominican Republic, Ecuador, El Salvador, Ethiopia, Guatemala, Haiti, Honduras, Iran, Kenya, Mexico, Nicaragua, Panama, Peru, the Philippines, the PRC, Singapore, South Africa, Taiwan, Thailand, and Venezuela. Within recent years, Israeli arms have appeared in Zaire, Brazil, Papua New Guinea, Argentina, the PRC, and in some tribal lands in South Africa. Reportedly, in 1984 Israel concluded a massive transaction with the PRC providing for arms transfers totaling some \$3 billion. Neither country has divulged the contents of that agreement.

The Israelis also have exported *Reshef* patrol boats to South Africa and to Chile. For its part, South Africa has built *Reshef* boats under Israeli license. The Israelis would like to convince other countries to ask for a similar licensing arrangement.

By the mid-1980s Israel exported arms products to some 54 countries and is gaining 2 to 3 new markets each year. Since IAI exports electronic warfare equipment, many potential foreign customers have made inquiries. The Italian Air Force has expressed

an interest in the Elta 2021 (look-down-shoot-down) radar for its future AMX strike fighter. A Latin American country (probably Brazil) has asked about the policies of coproduction under license. Israel also strives to shift its emphasis from military to commercial projects, from some 60 percent military work to a goal of only half. Its major foreign markets are in South America, the Far East, and the United States, but Israel also has targeted Western Europe.<sup>38</sup> The company believes that Israel enjoys two advantages in its drive to sell to West Europeans. First, Israel attaches no political strings to its sales and, second, it does not "sell and forget" as do some of its competitors. It continues to service that which it sells, a policy welcomed by buyers.

Although Israel remains an active arms exporter, it is well to note that its share of the world's arms market decreased between 1980 and 1985, falling from 7th to 15th place among arms exporters. This decline results from the entry into the world's arms market of an increasing number of competing nations, leading to a fierce scramble to obtain new contracts to produce weapons of every type and description. Only a very strong export marketing effort will enable Israel to retain its present position in the coming years.

Israel has achieved success in selling arms to other countries for three reasons. First, Israeli arms cost less than those of many of its competitors. Second, the Israelis have proved very reliable as arms suppliers, even under trying conditions. Lastly, in Israel's several wars with its Arab neighbors, Israeli military equipment has been tested on the battlefield and has been found effective.

Israel's foreign sales of air weapons have proved spotty. To gain a useful perspective of air weapons exports one must look at the nature and growth of Israeli Aircraft Industries (IAI). This firm presently derives from 60 to 70 percent of its annual sales from exports. It achieved exports of some \$520 million in 1982, about \$170 million more than in the year before. In that year, for the first time, IAI sold over the \$500 million and over 70 percent of its revenues came from export sales.

The Gabriel surface-to-surface missile stands as Israel's greatest defense export success.<sup>39</sup> By 1984, it ranked with the French Exocet and the US Harpoon as a best seller in the field. Gabriel, at \$300,000 per copy, costs less than half as much as its competitors. Israel has sold over 1,000 Gabriels to at least 9 countries while several other nations are believed to have ordered the system.

The Israelis have had limited success in exporting Kfir aircraft. Colombia reportedly has purchased 12 Kfirs. In mid-1984 the United States and Israel signed an agreement under which the Israelis leased 12 Kfir aircraft to the US Navy for use as an adversary-training aircraft.<sup>40</sup> Israel cannot sell the Kfir to anyone it wishes. Because the aircraft contains US technology, the Israelis must first gain US permission before transferring it to any other country. The Israelis also sold the Nesher aircraft, an Israeli version of the French Mirage III, equipped with Israeli-developed Shafir air-to-air missile, to Argentina. While upgrading and repairing its US Skyhawk fighters, Israel introduced its own fire control, navigation, and electronic systems but could not sell any

to Argentina. In May of 1981, President Reagan announced that the United States had purchased an undisclosed quantity of Israeli-made remote piloted vehicles (RPV's) for use by the US Navy.<sup>41</sup> Before a US veto of Israeli exports of Skyhawk aircraft to Argentina, Israel had sold Skyhawks to Honduras, Colombia, and Ecuador. The Israelis succeeded in selling aircraft to primitive, less developed countries when Papua New Guinea bought the Arava, a small transport aircraft.

Israel also has sold a limited number of naval vessels to other countries. News accounts have suggested that Israel sold Argentina four *Dabur*-class patrol boats and two *Dvora* multimission boats to Papua New Guinea. Israel also has received an export license to sell a hydrofoil vessel. In Asia, Israel has exported weapons to Taiwan, Thailand, Malaysia, Indonesia, and Singapore.<sup>42</sup>

#### 4. SOUTH AFRICA

**T**he Republic of South Africa's overriding concern stems from its racial mixture. Whites constitute almost 18 percent of the population, coloreds (of mixed origin) about 9.5 percent, and Asians (chiefly Indians) some 3 percent, with the vast majority of the people being black.

South Africa's racial conflicts are embedded in the history of the country. The land was settled by people of Dutch, Huguenot, and German descent. They halted a serious invasion from the north by Zulu tribes. The Boers, of Dutch descent, bitterly contested the British for control of the land in the Boer War.

The white Afrikaner ruling party has imposed a policy of apartheid, which mandates a total separation of nonwhite races from political and economic power. This policy is repugnant to many of South Africa's friends, including the United States.

South Africa has a 1,100-mile northern border with countries governed by black leadership. One of the areas of greatest controversy was Namibia, which South Africa controlled despite United Nations and World Court decisions declaring Namibia

independent of South Africa's administration. In occupying Namibia, South Africa faces military pressures from the South West African People's Organization (SWAPO). This guerrilla organization operates from bases in Angola, its northern neighbor. South African troops have attacked SWAPO units, inside both Namibia and Angola, for the past 16 years and reportedly assist UNITA forces fighting the leftist Angolan government.<sup>1</sup> An estimated 20,000 Cuban troops provide military assistance and support to the Angolan government.<sup>2</sup> In 1988 South Africa negotiated an agreement with Angola to give independence to Namibia if the Cubans pulled out of Angola.

Mozambique provides sanctuary for a black liberation group known as the African National Congress (ANC), pledged to fight the South African government. South African military forces have made incursions into Mozambique to attack rebel strongholds.<sup>3</sup>

The Pretoria government does not hesitate to use its overwhelming military force to achieve its objectives of border control and internal suppression. The annual defense expenditure is \$2.5 billion, about 18 percent of the total South African budget. Although some African states have larger armies, none can compete with South Africa's well-equipped ground, air, and naval forces. The South Africans are seasoned troops, using combat-proven weaponry. Even the Angola based Cuban troops, estimated at 20,000, proved incapable of confronting and holding areas against South African military forces.

The government of South Africa continues to face increasing pressures to integrate blacks into the country's mainstream politics. Nevertheless, a rising wave of black activism has forced the government to keep its police and army in a high state of alert. The country devotes twice as much of its GNP to defense now as it did in 1970. At the same time, South Africa turned to Italy, France, and Israel to purchase aircraft and naval vessels. South Africa also has made great strides toward achieving self-sufficiency, especially in ground warfare, because it possesses the skilled labor force, knowledgeable management, technology, and raw materials needed to produce its arms.

Compared to other African states, South Africa enjoys a powerful economy. It is a net exporter, selling to others about twice as much as it imports, excluding gold. Its major exports include gold, wool, diamonds, corn, uranium, metals, metallic ores, and asbestos. The country boasts the best telecommunications system on the continent with over a million telephones, 2.5 million radios, and a million television sets. It also has a satellite station with Atlantic and Indian Ocean antennas.

South Africa also is nurturing its industrial staying power to counter a prolonged or more effective embargo. It has stockpiled a two-year supply of oil, accelerated oil exploration, and acquired a tanker fleet. It trails just behind the United States and Canada in producing uranium oxide. In addition, it has installed a new, inexpensive uranium enrichment process in a pilot plant. Thus, South Africa has both the resources and technology to build nuclear weapons, although its government has announced that it

will pursue only the peaceful uses of nuclear power. Even though the massive build-up of defense industries has distorted South Africa's economy to a degree, the South African government is willing to accept the penalty because it sees that the nation's survival is at stake.<sup>4</sup>

### Defense Industry

The worldwide arms embargo sponsored by the United States (but not complied with by a number of arms exporting nations) led South Africa into forced isolation and the need to produce its own weapons. Given the relatively high level of the country's educated and technically trained manpower, especially engineers and managers, South Africa could overcome the difficulties and develop adequate weapons to counter any conceivable attack against it.

Although South Africa has succeeded in manufacturing much of its needed arms locally, the embargo forced the country to lay out large sums of money for national defense and prevented South Africa from gaining access to many advanced weapons. While the country has acquired the knowledge to manufacture artillery, small arms, armored vehicles, missiles, electronics, and communications equipment, it still lags behind in such critical fields as aircraft, tanks, and avionics.

Before 1985 the quality of South African weapons seemed no better than that of the Soviet equipment in the hands of their black neighbors to the north. In their forays into Angola in 1985, South African forces faced Soviet weapons. Soviet artillery and multiple rocket launching systems had a significant range advantage. Some analysts say that only

the superior training and motivation of South African soldiers made their assaults successful.<sup>5</sup> The South Africans reportedly remedied this situation and since then their equipment is almost always qualitatively superior across the spectrum.

South Africa established a Munitions Production Board in 1964; Its name was changed to the Armaments Board in 1968. This organization controls the manufacture, procurement, supply, and defense research for the South African Defense Forces: the state-owned organization. The Armaments Development and Production Corporation (Armcor), claims to be the tenth largest arms manufacturer in the world. This company employs some 23,000 people and ranks as the third largest industrial enterprise in the country.

Armcor has a number of subsidiaries, including Infoplan (computer services), Kentron Eloptra (guided weapons and optical equipment), Lyttleton Engineering Works (LEW) (small arms and guns), Musgrove (commercial small arms), Naschem (bombs and heavy caliber ammunition), Pretoria Metal Pressings (small caliber and quick fire ammunition) Somchem (explosives, propellants, and rocket systems), Swartklip Products (pyrotechnics, hand grenades, and commercial ammunition) and Atlas Aircraft, incorporating Telcast.<sup>6</sup> In recent years Armcor has shifted its production from emphasizing anti-guerrilla equipment to stressing conventional weapons such as naval equipment, armored vehicles, and heavy artillery. The corporation reportedly is meeting some 90 percent of the total domestic military needs. It also depends on some 800 private contractors such as LEW.

In 1983, to show Armscor's sense of mission, a high official of the company said that if it became necessary, Armscor would "fight dirty" to gain the arms the country needed. He went on to add that South Africa would build up its defense industries in order to prevent "blackmail attempts." Thus, by developing and producing its own weapons, South Africa would reduce its vulnerability.<sup>7</sup>

The type of threat that South Africa perceives naturally helps determine the arms that it produces. Its army requires great mobility and a capacity for traveling over long distances. Thus, Armscor prefers wheeled to tracked vehicles. Armed with such weapons, the South Africans can operate effectively against rebel guerrillas fighting in the countryside. Consequently, with French help, Sandock Austral Pty. Limited, has produced the AML-90 armored cars and the Eland light-armored car. South Africa also designed and produced the Ratel infantry fighting vehicle, armed with a 20mm gun, a machine gun, and slots for soldiers to fire through behind armor protection. The South Africans have tested this vehicle in combat against SWAPO guerrillas in Angola with great success.

South Africans also have developed the G5 155mm "Supergun" artillery piece, the jewel in its product range.<sup>8</sup> Armscor also has developed a highly mobile version of this cannon, called the G6, mounted on a specially developed 6-wheel armored vehicle. This vehicle also is fitted with grenade launchers and a light anti-aircraft machine gun. The vehicle can travel at 50 mph on highways and 25 mph across rough terrain. Its guns can fire accurately up to 25 miles. Another South African ground weapon

is the Valkiri 127mm artillery rocket system, based on the Soviet designed Russian Stalin Organ. Mounted on trucks, the 24 rocket tubes can unleash devastating firepower. The South Africans used this weapon effectively against Cuban troops in Angola.<sup>9</sup>

The South Africans appreciate the need for air weapons in their defense posture. In common with most new arms producers, the Atlas Aircraft Corporation manufactures locally either its own designed equipment or arms built under license from abroad.<sup>10</sup> The Impala trainer aircraft, built under license from Italy, is a version of the Aermacchi trainer. Atlas also has designed a single seat strike version of this aircraft, designating it the Impala MK II. This aircraft maneuvers well and can serve as a counter-insurgency fighter-bomber. Production of the French Mirage F-1 (air superiority and ground attack 2) aircraft has continued under a license from Avions Marcel Dassault.<sup>11</sup> In May 1984, the Defense Ministry disclosed that South Africa plans to build its own helicopters, but gave no details. Aerospatiale's Alouette seems the most likely candidate. South Africa also manufactures some missiles such as the previously noted surface-to-surface Scorpion, based on the Israeli Gabriel missile, and a derivative of the French Crotale surface-to-air missile.

Armcor produces the Cactus surface-to-surface missile system, originally designed by the French with South African funding. South Africa also builds the acquisition and guidance radar for this system. Little is known about South Africa's air-to-air missile development and production capability, but it may be producing the Kentran while the

Whiplash air-to-air missile reportedly is of South African design.<sup>12</sup> The South Africans also have the Scorpion missile emplaced on several operational naval craft.<sup>13</sup>

South Africa is changing the role of its navy, shifting from an emphasis on antisubmarine warfare to defensive operations, ensuring the territorial integrity of the country. The South Africans have looked to Israel as a source of naval ships. They purchased six *Reshef*-class boats from Israel, three were built in Durban, South Africa, and three in Israel. The South African navy found difficulties performing its sea surveillance tasks with these small vessels.<sup>14</sup>

### Exports

With an expanding defense industrial base, South Africa looks for opportunities to export arms. Foreign sales can help recoup research and development costs, reduce the unit costs of military items by taking advantage of economies of scale, and provide trade benefits. The degree of success South Africa achieves in exporting arms will largely determine how rapidly the base can expand and the willingness of other states to buy military items from a political outcast. One should not forget that South Africa must produce weapons domestically to avoid allowing the embargo to endanger its security.

Armcor sends salesmen abroad with goals to boost arms exports from the 1982 level of \$8.6 million a year. The government follows a policy of selling to foreign countries that are neither communist nor hostile to South Africa. Potential markets seem to be located in Latin America, the Middle East, the Far

East, and Africa. In addition to the G5 155mm artillery piece (capable of firing a tactical nuclear warhead), South Africa hopes to sell missiles, armored cars, troop carrying vehicles, fast missile-firing boats, and sophisticated telecommunications equipment.<sup>15</sup>

South Africa's extreme secrecy about its foreign arms markets makes it difficult to determine which countries buy South African weapons. In 1980 the Popular Front for the Liberation of Saguiet al-Hamra and Rio de Oro (Frente Polisario), captured South African equipment from the Moroccan army in its 6-year old war for the Spanish Sahara. The Popular Front found South African Ratel infantry fighting vehicles and Eland light armored cars. Morocco was especially sensitive to this finding because, as a member of the Organization of African Unity and the Arab League, it should oppose trade with South Africa.<sup>16</sup> Morocco purchased these arms when the United States and France refused to sell arms that Morocco could have used in the Sahara conflict.

In summary, South Africa was the third largest exporter of weapons among newly industrialized countries in the period 1977-80, trailing only Brazil and Israel. South Africa's growing arms production capacity has reduced its dependence on other countries for military sales and aid. As South Africa continues to emphasize domestic arms production, the United States must closely monitor the implications of the shifting balances of power in this region.

## 5. SOUTH KOREA AND TAIWAN

South Korea, over the last decade, has developed a substantial capability to manufacture military items. The country's armed forces use most of these items, but South Korea increasingly exports military products around the globe. This growth in South Korea's defense industries presents opportunities and poses problems for US decisionmakers.

After the Korean War the country lay in shambles. With most of its factories and farms destroyed and few natural resources to fall back on, the prospects for economic growth in the early 1950s appeared bleak. Many developing countries today, however, would like to duplicate South Korea's leap from poverty in the 1950s to the relative prosperity it now enjoys. National income has quadrupled in real terms while per capita income has risen some 230 percent.<sup>1</sup>

Numerous factors account for South Korea's rising prosperity. Peace, large amounts of US aid, the work ethic, and the relatively high educational level of the people helped to achieve this success. Since the early 1960s the government has guided the destiny of Korea's businesses. South Koreans have evolved an economic system based on a pragmatic

mixture of market and non-market forces. When the market works, South Koreans follow laissez-faire practices; when it doesn't, government officials intervene. Their actions range from friendly phone calls to public ownership.

For about the past twenty years the government has based its strategy for rapid economic growth on heavy industrial exports. These heavy industries include shipbuilding (in 1980 South Korea ranked second in the world in shipbuilding orders), steel, motor vehicles, and petrochemicals.<sup>2</sup> South Korea's industrial sector also suffers the same recessionary pressures prevalent in all the industrial world. GNP growth has slowed to about 6 percent and exports, except for ship and machinery exports, have declined significantly.<sup>3</sup> The slowdown largely resulted from the weak purchasing power in the United States, Japan, and Western Europe. In response to this economic downturn, the government, in its 1982-1986 five-year plan decided to invest more in light industries and in social projects such as housing, power plants and subway construction. The plan also calls for significant additional investments in textiles, electronics, shipyards, and oil refining and storage facilities, some 19 major projects in all.

For about 15 years following the end of the Korean War in 1953, South Korea concentrated on rehabilitating and reconstructing its economy, receiving active assistance from the United States. During this period the South Koreans depended on the United States for most of their weapons and other military material. Since that time, however, it has joined the ranks of the world's middle-level manufacturers of military items. In spite of this

progress, South Korea remains one of the leading arms importing countries in the world. The United States sells most of these arms to South Korea and also provides much of the technology used by the Korean defense industry in its domestic production efforts.

The South Koreans obviously require a strong military force because North Korea poses a serious threat. The North Koreans have conducted a massive military build-up for over two decades. They have invested more money, per capita, on military items than any other country in the world except, possibly, Israel. As a result of this build-up, North Korea now enjoys a force ratio of about 5 to 1 over the South.<sup>4</sup> North Korea surpasses South Korea in terms of ground combat forces, fire power, and armored mobility, and enjoys an edge in naval and air force arsenals. North Korea has attacked the South before and has the military might to do so again.<sup>5</sup> From time to time the North has launched a wide range of limited provocations in the South. Since the armistice, North Korea has committed as many as 2,600 violations of the truce terms, including the digging of secret infiltration tunnels under the demilitarized zone.<sup>6</sup> North Korea's leader, Kim-Il-Sung, has declared that, "If and when a war breaks out in Korea, North Korea will only have the military demarcation line to lose and the unification of the fatherland to gain."<sup>7</sup> Such threats drive the South Koreans toward a determined expansion of their military industry. South Korea also depends on the United States to supply the additional military might that would strengthen the overall defense of the country.

## Defense Industries

The South Koreans believe that having a capability to build their own arms helps them maintain a realistic deterrent. The South Koreans also feel that their defense factories could provide a rapid and dependable mobilization capability. They have placed most of their defense plants well below the demilitarized zone, making them less vulnerable to North Korean attacks. These factories should be able to provide a continuous flow of military items, specifically designed to meet their unique combat requirements. In 1982 President Chun indicated that South Korea had made plans to stimulate the R&D of high-technology weapons and the mass production of arms and munitions.<sup>8</sup>

Once the South Korean government decided to develop its defense industries, it first developed a plan that took advantage of the country's strong petrochemical, iron and steel, and machine industries. These industries formed the basis upon which the South Koreans built their defense sector because their production methods were similar to those needed in defense industries. The plan also addressed potential problems related to the scale of investment, to business risk, to importation of technology, to the need for raw materials, and to quality control.<sup>9</sup> To support the infant industries, the South Korean government adopted policies emphasizing long term, low interest loans, tax favors, profit guarantees, and draft exemption for key employees. However, it did not allow any Korean company to have more than 30 percent of its capital investment devoted to defense products.<sup>10</sup> The Koreans adopted

this policy in order to provide a broad base of support for industry, while minimizing the financial risks.

The government also has established R&D organizations with the mission to provide technical assistance to defense contractors. South Korean R&D managers very carefully selected 10 basic items from among the US-made weapons and equipment of the Korean forces. On a trial basis, they then fabricated copies of these 10 items. The government likewise chose its contractors from among companies best known for their technical capabilities and business acumen. These contractors first undertook trial production. Achieving positive results in this initial effort, the South Koreans felt that they could, with confidence, make their ambitions a reality. South Korea likewise produced several artillery weapons on a trial basis. Again, the results have proven heartening. Based on these successful programs, the South Koreans next conducted research on production techniques for most of the conventional weapons systems and other military items used by their forces. Armed with this knowledge, in the first half of the 1970s they began producing relatively simple items, moving later to more complex systems.

By the mid-1980s some 80 to 90 South Korean defense contractors produce a wide range of products that satisfy an estimated 70 percent of the nation's requirements for military equipment.<sup>11</sup> The products range from uniforms, parachutes, and rifles to sophisticated, complex systems such as tanks, helicopters, jet aircraft, and frigates.<sup>12</sup> Most of the technology still comes from the United States.

Slowly, but surely the South Koreans are diversifying their arms sources, and improving their own in-house capabilities to do original R&D work.

Korean defense industries, like other arms manufacturers in most industrializing nations, largely produce copies of conventional US weapons and equipment. However, over the past 10 years the Koreans have made efforts to modify some US items, making them more responsive to South Korean needs. They also have produced a few new items, based on South Korean or West European technology. They called these newly modified products, "K-type" items.

To counter the North Korean threat, South Koreans must modernize their forces and provide them with increased capabilities to fight a protracted war. South Korea's Force Improvement Plan for 1982 to 1986 emphasized the procurement of modern artillery, anti-tank weapons, and armored fighting vehicles. It also called for larger stocks of munitions and other war reserve material to meet the anticipated intense demands of modern combat. This latter requirement might prove particularly important because the North Koreans reportedly can sustain 90 days of combat without resupply.<sup>13</sup> South Korean defense industries will have to meet the bulk of future ground defense needs. They must emphasize meeting the Korean Army's needs because in any future war on the Korean peninsula ground forces most likely will play the key role.

If South Korean arms producers succeed in providing the bulk of the needed arsenals, then they must stay competitive with other arms merchants,

and they must continue to show business profits. Although profits have sharply declined recently, and well over 50 percent of their production capability lies idle, the prospects for long-term growth within most of the Korean defense industry appear favorable. Their factories produce high quality goods and charge relatively low prices. Consequently, as the recession ends and more and more money becomes available, demand for South Korean military products should increase accordingly.

In the meantime, the government most probably would attempt to weather this economic storm by encouraging consolidation in South Korea's defense industries to reduce overcapacity.<sup>14</sup> The government will probably grant additional tax credits and provide liberal credit and loan repayment schedules. In general, the country will do whatever is necessary to keep this vital industry healthy. Of interest here, South Korea sees arms exports as one of the best solutions to a recession.

Korea has been able to produce many weapons used by its ground forces. Korean defense industries manufacture 105mm howitzers as well as recoilless rifles and mortars, all of American design. They also produce an austere version of Vulcan anti-aircraft guns and mortars, grenade launchers, and submachine guns. Korean engineers and technicians have developed an indigenously designed multiple-artillery-rocket launcher, and have become competent at repairing and modernizing older, conventional weapons. Thus, the US M48 tanks have undergone extensive updating and improvement. As has happened in other industrializing countries, having developed a competence to repair and rebuild a major

weapon, the Koreans have designed a tank, the XK-1 or Rokit tank with the technical assistance of General Dynamics. Korea started production of this tank in 1984.

Korea has become a coproducer with Italy of the FIAT 6614 wheeled personnel carrier, with most of the parts manufactured locally. The country also is building US-designed trucks and jeeps as well as a number of electronic devices, including radio sets and microprocessors. Korea also produces a variety of munitions, including the necessary explosives, hand grenades, mines, bombs, fuzes, propellants, and ignition cartridges.

Korea's shipbuilding industry has become the second largest in the world. Its largest shipyards include Hyundai-Mipo, Korean Shipbuilding and Engineering Corporation, and Korea-Tacoma Marine Industries. These yards have built patrol craft, frigates, and corvettes. It is reported that either Hyundai or Korea-Tacoma will receive contracts for constructing a submarine. Other shipyards construct patrol craft and advanced minesweepers.

South Korea also showed a desire to build aircraft. By 1979 it had developed an aggressive aircraft industry aimed at modernizing its military air capability. It had hoped to design and develop its own aircraft by the late 1980s. South Korea is coproducing Hughes 500D helicopters and developing a modified version of the Nike Hercules surface-to-surface missile, as well as a local model of the Honest John missile. Korean Air Lines was scheduled to coproduce with Northrup the F-5F twin-seat, trainer-reconnaissance fighter. Sam Jung Precision and Industrial

Company Ltd., coassembles engines with the assistance of General Electric.<sup>15</sup> The Koreans also have developed a barrage rocket system and Korean Air Lines has played a key role in helicopter production and F-4 maintenance.<sup>16</sup> In a joint venture with Hughes, Korea helped redesign the TOW anti-tank launcher called the XM-65. This missile was designed for the US Huey-Cobra helicopter with the aim of reducing weight and drag.<sup>17</sup>

### Defense Exports

From 1968 through the end of 1976 the South Koreans directed their defense industry almost exclusively toward meeting domestic requirements, and did not aggressively push exports.<sup>18</sup> In fact, during this 9-year period the value of all their arms exports amounted to only about \$10 million dollars. What few products they did sell abroad consisted mainly of non-weapon or quartermaster type items such as gas masks, communications equipment, uniforms, and tents. As the defense industry grew and opportunities to sell their military products abroad increased, the pressures to modify their export policies intensified. By the mid-1970s the government decided to move cautiously into the arms exporting business. Its export plan resembled the scheme previously fashioned to develop domestic arms production. It started by exporting non-lethal items first, then moved on to unsophisticated small arms and ammunition, and finally began to sell more complex weapons.<sup>19</sup> Most of these projects are intended to spur exports which the government believed would expand from \$20.5 billion in 1982 to some \$53 billion by 1986.<sup>20</sup>

Once the government decided to sell arms abroad, in typical South Korean fashion, it worked hand in glove with the civilian defense contractors to make the export campaign a success. Perhaps the best example of this cooperative effort came in the fall of 1981. As part of an annual Armed Forces Day celebration, government leaders arranged for some 92 local producers of arms and other defense related equipment (the Korea Defense Industries Association or KDIA) to exhibit their products and services from 25 September to 4 October 1981, at the modern Korean Exhibition Center in Seoul.<sup>21</sup> Labeled KODEX-81, the exhibition provided a great opportunity for the privately-owned defense industry to show off the range and quality of its wares to prospective buyers from abroad, especially to those from the Third World countries.

This exhibition, the first put on by the South Koreans, proved a success. It attracted over 85,000 visitors from some 63 countries.<sup>22</sup> Items on display ranged from barbed wire, uniforms, and communications gear, to bombs, howitzers, missiles, tanks, naval vessels, and helicopters. KDIA officials reported that Korean companies signed purchasing contracts worth more than \$100 million.<sup>23</sup> Another South Korean defense exposition, on a scale equal to or larger than KODEX-81, took place in 1984. In addition, South Korean salesmen, up to and including President Chun, have gone on the road seeking new markets. As an example, during President Chun's two-week swing through the Association of Southeast Asian Nations (ASEAN) countries in June of 1981, he placed the sale of defense equipment high on his priority list. The value of announced sales

jumped from about \$5 million in 1977 to roughly \$250 million in 1981.<sup>24</sup>

Since the South Korean government hesitates to publish data on arms sales, these export figures most likely understate the actual case. It seems reasonable to assume, however, that if the South Koreans are making a particular defense product, they have either sold some of these items already, or they are pushing vigorously to do so in the future. In their original export plan the South Koreans decided to aim their advertising campaign at the Third World and, not surprisingly, that is where they have achieved most of their exporting success. Many developing nations in East Asia, the Middle East, Latin America, and Africa have purchased South Korean defense wares. Based on significant purchases of naval vessels, Indonesia would appear to be their "best" customer.

In its drive to become a major arms supplier, South Korea faces numerous difficulties and challenges. Probably the biggest obstacle results from a US desire that Korea should limit its arms sales to some reasonable level. In the past the United States supported the development of arms production capability in South Korea to achieve self-sufficiency. However, as discussed at the outset of this study, selling arms abroad in large quantities poses a different problem. Foreign sales raise issues like arms control, competition with American arms dealers, and US unemployment rates. As in the case of Israel, much of South Korean arms exports must be approved by the US government because Korea's export items contain US technology. Increasing levels of competition from other arms producers in the

Third World will also tend to restrict South Korean exports. Many of these nations enjoy some of the same advantages as Korea, and they will be vying for the same markets.

In conclusion, South Korea most likely will continue to move slowly away from its dependence on US arms and technology. The Koreans increasingly will attempt to rely on their own R&D as well as on the R&D of other non-US suppliers. This shift, however, should take place gradually because the military, political, and economic ties that bind the two countries remain strong. Furthermore, although South Korean dependence on US technology restricts Korean arms exports, in practical terms, Korean national security interests demand that its relations with the United States remain firm.

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Taiwan, the Republic of China, represents an anomaly. The country has diplomatic relations with less than 30 states. Its massive neighbor across the Formosa Strait, the PRC, claims Taiwan as a province of China and the government on Taiwan asserts that it remains the legitimate ruler of all China. Taiwan's strongest economic and political backer, the United States, changed course in 1978 by withdrawing recognition from the Nationalist government and establishing full diplomatic relations with the PRC. Taiwan has some 18 million people in

contrast to a billion or more across the straits. In the view of many, Taiwan would appear to be on a descending curve. Yet, economically just the opposite appears true.

Taiwan is one of the Third World countries experiencing an economic "miracle." From 1953 to 1962, its economic growth averaged 7.5 percent yearly. From 1962 to 1972 growth increased to 10.8 percent annually, and from 1973 to 1980, despite two oil shocks, growth still maintained an impressive 8.7 percent yearly. In the three aforementioned periods, Taiwan's export growth was 19.5 percent, 29.9 percent, and 25 percent per year while average industrial production was 19.5 percent, 29.9 percent, and 25 percent per year; yearly average industrial production rose by 11.7 percent, 18.6 percent, and 11.9 percent respectively.<sup>25</sup>

This powerful and continuing economic development, together with Taiwan's virtual pariah status among the majority of the world's countries, prompted the island's leaders to begin going their own way in arms production. Above all, the Chinese Nationalists who ruled Taiwan continue to oppose vigorously any merger agreement with the PRC. This state of mind, together with Taiwan's demonstrated economic potency, clearly influenced Taiwanese defense planning.

### Defense Industries

Because its very independence and survival remain continually under potential attack, Taiwan must maintain a level of defense planning and of expenditures matched by few other countries of its size. As one observer noted, "Local industry (on Taiwan) is an integral part of defense planning as it is in

the Republic of South Africa."<sup>26</sup> Taiwan, for example, has the fourth largest standing military force in terms of the ratio of manpower to age 18 to 45 population, exceeded only by that of North Korea, Israel, and Syria.<sup>27</sup> Some indication of Taiwan's improved defense production is seen in the fact that between 1978 and 1984 Taiwan's production of its required components increased to about 50 percent.<sup>28</sup>

When the United States recognized the PRC and pledged to reduce its military support for the Chinese Nationalists on Taiwan, Taipei placed a high priority on local production of military items, including the production of an advanced fighter aircraft. Whether Taiwan can achieve industrial self-sufficiency remains in doubt; some would argue that achieving this goal is impossible. Taiwan has only three other outside sources from which it might acquire military equipment—Western European countries; the Soviet Union and its client states; or, newly industrializing countries.

Even before the United States shifted recognition from the Nationalist Chinese to the PRC, European countries were reluctant to sell Taiwan large quantities of newer weapons. After the US switch, they became even more uninterested in military sales to Taiwan. The Chinese Nationalists on Taiwan would have to swallow hard before they would import Soviet arms. After all, they are fighting another communist country in the PRC, whose ideology they deplore. They also would have doubts about the Soviet Union's reliability as a supplier.

Defense firms on the island include Taiwan Machinery Manufacturing Corp., China Shipbuilding Corp., Taiwan Aluminum Corp., Chinese Petroleum

Corp., Taiwan Metal Mining Corp., BES Engineering Corp., China Petrochemical Development Corp., China Steel Corp., and Chung-Tai Chemical Engineering Corp. The Aero Industry Development Center produces the AIDC XAT advanced jet trainer and the Northrup/AIDC F-5 E/F that remains the mainstay of the combat fleet of Taiwan.

In 1982, after many months of tense wrangling both within the US government and between the United States and the PRC, the United States rejected Taiwan's request for the F-20 fighter aircraft. On the other hand, the United States extended the co-production agreement on the F-5 model. This action accorded with policy enunciated in the US-PRC communiqué of August 1982 in which the US government stated that it would reduce gradually its sales of arms to Taiwan.<sup>29</sup> The PRC has complained that the US proposal to sell \$260 million of antisubmarine equipment to Taiwan violated the 1982 communiqué.<sup>30</sup>

Taiwan seems to have geared its defense industry to a realistic appraisal of the military challenge posed by the PRC. It clearly saw air power as a major strategic factor. Neither the Communists nor the Nationalists have enough naval power to undertake a major amphibious or airborne assault on the other without huge losses.<sup>31</sup> Indeed, to date, Taiwan has selected as the centerpiece of its defense effort the co-assembly of Northrop's F-5 fighter planes to be built by AIDC.<sup>32</sup> Taiwan's leaders at one time had considered buying Israel's Kfir aircraft. The Kfir represents the type of advanced aircraft that the Chinese Nationalists want. However, because such a transaction would alienate Saudi Arabia, on whom

Taiwan relied for oil and other forms of economic benefit, Taiwan dropped any plans it had to acquire the Kfir.<sup>33</sup>

Taiwan does plan to develop a high technology fighter aircraft. It has gained great experience from its co-production of F5-E nose sections which it ships to Northrop for production in California. Some 60 percent of the F5-E harness wiring takes place in Taiwan because the nose section has the largest number of electronic circuits.<sup>34</sup> The Taiwan government has allocated some \$150 million for R&D for engine development. Those familiar with the costs of such a project estimate that the country will have to spend about \$1 billion to import the high technology which can be used in an advanced fighter.<sup>35</sup>

This Indigenous Defense Fighter (IDF), constitutes the third aircraft that Taiwan's Aero Industry Development Center has developed based on original Taiwanese designs. Taiwan's leadership believes that it must maintain a critical, "qualitative edge," in its fighter aircraft over the numerically far superior PRC Air Force. A prototype of the IDF aircraft was rolled out in 1988, but there are doubts that it will become a serious production item.

To obtain an improved jet trainer and attack aircraft, Taiwan has developed and currently is producing the AT-TC 3. This aircraft reportedly can be fitted with two Sidewinder missiles, bombs, and rockets. Taiwan has made progress in producing weapons such as electronic communications vehicles—Tien Kung I surface-to-air missile to replace its aging Hawk missile and Tien Kung II to replace Nike-Hercules missiles. The armed forces soon should acquire a short-range and a long-range air-to-air missile.

Taiwan's navy is facing block obsolescence because much of its fleet is composed of World War II ships. Since 1976 the navy has been developing in-country production of systems ranging from surface-to-surface missiles to naval vessels. The navy also is developing mines and antisubmarine warfare capabilities. It has constructed 30 Israeli-designed *Dvora*-class missile patrol boats. Naval leaders consider it most important to develop and produce high speed missile patrol boats to assist in gaining control of the sea. China Shipbuilding has the drydock capacity for constructing state-of-the-art warships. The navy has identified the need for a new class of 1,000-ton corvettes and 3,000 ton frigates.

As to land vehicles, Taiwan probably would profit more from upgrading and expanding its existing tanks and armored personnel carriers rather than from trying to design and build its own new military vehicles. Such projects as re-engineering, regunning, and retrofitting fire control systems seem to offer the greatest output for the resources that Taiwan puts into this field. Taiwan also has made progress in producing the 155mm artillery piece, giving it increased range and dependability.

Taiwan's ability to keep pace with development in electronics might very well prove the most crucial requirement affecting its military power in the future. After all, as stated earlier in this study, the technology of electronics has become the *sine qua non* for future military power. The Sinchu Science Based Industrial Park should give Taiwan a formidable asset in building up its defense industrial establishment. The park houses the offices and plants of some 37 firms and the government courts other firms to

settle there. Sinchu Park lies near the National Tsinghua University and the National Chiaotung University, both having first-rate engineering schools. Taking advantage of this concentration of modern technological knowledge, Taiwan hopes to shift its economy from labor intensive to high-technology industries.

### Exports

As yet, Taiwan has not emerged as an important arms exporter. Two interrelated export issues color the future of Taiwan: First, will Taiwan's increasing emphasis on military self-sufficiency lead it to export markets as a way of supporting its defense production base? and, second, will Taiwan's thrust towards becoming a "high technology" economy lead it to military applications with export potential?<sup>36</sup>

In 1952 some 82 percent of Taiwan's exports were either raw or processed agricultural products. By 1980, an estimated 38 percent of Taiwan's exports consisted of heavy industrial goods. In 1981 Taiwan became the fifth largest source of machine tools imported into the United States. In terms of exports, the growing electronics industry on Taiwan in 1980 exported some \$3 billion worth of products, overtaking textiles as the country's biggest employer.<sup>37</sup> In the early 1980s more than half of Taiwan's \$45 billion GNP represented foreign sales.<sup>38</sup> The country turned out 50 percent more engineers per capita than does the United States and the US government has fostered the development and production of semiconductors in the island.<sup>39</sup>

In addition, Taiwan reportedly may try to market its own patrol boats, fitted with a locally produced version of the Israeli Gabriel 2 surface-to-surface missile, built under license. Taiwanese industry also plans to manufacture a laser rangefinder, importing the needed laser rods from the United States or from South Africa,<sup>40</sup> as well as adding \$288 million for some undisclosed projects.<sup>41</sup>

## 6. THE CURRENT ARMS ENVIRONMENT

**B**y the middle of the 1980s the international situation for the arms market began to change. Assumptions that arms producers and exporters had made in the preceding decades no longer proved valid. The end of the Iraq-Iran war reduced the need for copious arms exports to the Middle East. Above all, a downward shift in the world's economy required arms producers to change their estimates of the global arms market.

### Economic Downturn

As the last half of the 1980s began the worldwide sales of arms started to level off, in great measure due to a global economic downturn. More specifically, the precipitous decline in the use and price of oil greatly decreased the ability of oil rich North African and Persian Gulf states to import large numbers of expensive military items. During the 1970s the oil wealthy countries had gone on an arms buying spree. One should not be surprised at this trend. Since the end of the Vietnam War these nations have experienced more armed hostilities than any other region. As oil revenues slipped, so did the

ability of nations like Libya, Algeria, the United Arab Emirates, Kuwait, Saudi Arabia, and other such countries to purchase additional arms. For example, with the advent of the oil glut, Qadhafi of Libya slashed his purchases of arms from about \$750 million to some \$300 million in 1984.<sup>1</sup> Moreover, some heavy importers of arms were experiencing difficulties in absorbing the huge military inventories that they already had accumulated.

Simultaneously, the prices of commodities on which so many Third World countries depend to earn foreign exchange have become depressed. These nations witnessed a considerable drop in the price of agricultural and raw materials, increasing the difficulty of earning hard currency. At the same time, additional arms exporters from the newly industrializing world entered the international market, intensifying competition, especially for middle and low technology weapons and military equipment.

We cannot expect the arms trade to dry up or shrink. First of all, many of the weapons which the Third World nations bought in the 1970s and 1980s still remain to be delivered. Thus, the flow of arms from major suppliers would continue for some time to come. In addition, newly industrializing Third World states are beginning to buy arms from each other. The sale of armored cars from Brazil to Iraq; of *Reshef* patrol boats from Israel to Chile; of Pucara aircraft from Argentina to Uruguay; of landing ship tanks from South Korea to Indonesia; and of Gabriel missiles from Israel to Argentina represent only some of the weapons exports among Third World countries. Stephanie G. Neuman has noted that,

"Intra-Third World trade is growing. A rising number of Third World countries are purchasing more major (military) equipment produced in other LCD industries."<sup>2</sup> Finally, tensions in many parts of the world continue unabated. Feelings of insecurity will prompt nations to look to bolstering their defense capabilities. Thus, Third World countries will continue either to import or to increase the domestic production of arms. In fact, one source estimates that from 1985 through 1990 Western countries should supply some \$75 billion in military equipment and support for the Middle East alone.<sup>3</sup>

The French seem optimistic about opportunities for selling arms in the coming decade. French arms exports in 1984 continued to grow from their 1970s level; by 1984, French arms exports amounted to more than \$7 billion. The French have concentrated their arms flows to Middle Eastern countries and Persian Gulf states, chiefly oil countries. Of importance in this discussion is the fact that, in part, the French achieved their export success by allowing technology transfers. They sold turnkey plants to importing countries, so helping their buyers to build equipment and spare parts under long range contracts.<sup>4</sup>

Recent worldwide economic woes have affected the new arms producers in two contradictory ways. On the one hand, Third World countries have less money to invest in building up weapons manufacturing capabilities and they confront competitive difficulties in expanding their arms exports. Additionally, given the recent volatility of the economies of several of these newly industrializing countries, little incentive exists for their defense

industries to make long-term investments. Because many of the arms firms in these lands had flexible production lines and labor intensive production methods, they could more easily shift to meet increasing demands for civilian products, lessening the defense share of their manufacturing. They manufacture weapons or components because they then do not spend precious foreign exchange on importing arms.

Yet, newly industrializing countries recognize that they have to continue to expand their R&D projects to produce new weapons. In order to keep up as much as possible with the technological progress made by the major arms suppliers, newly industrializing powers must undertake some R&D in state-of-the-art war or space technologies.

#### Access To Technology

In order to gain access to some of the most advanced weapons technologies Israel requested to join the United States in developing the Strategic Defense Initiative (SDI). The Israelis were preparing, for example, an SDI related theater defense architecture study for NATO's central region.<sup>5</sup> The time might not be far away when the Israelis will have to prepare a similar study for their own territory. They already might be doing so. The Israelis have long faced the threat of Soviet Frog and Scud missiles in the hands of Syrian Armed Forces, but, because the Syrians lack the capability for accurate firings and are fearful of Israeli retaliation, the Syrians have not used these weapons. The SS-21 missiles have a 120 kilometer range, placing all of the heavily populated

and industrialized areas of Israel within the range of Syrian launching sites.

Between 1983 and 1984 Syria received some 24 SS-21 surface-to-surface missiles. These missiles have cluster-bomb warheads and perhaps could be fitted with chemical warheads. They could wreck havoc with Israeli cities and military installations. The sale of Silkworm missiles from the PRC to Saudi Arabia adds to Israel's concern. Israel's development of its Jericho missile as well as the successful launching of its first orbiting satellite in 1988 portend a possible satellite intelligence capability and a system that might be able to interdict enemy missiles directed against the Jewish homeland. Israeli engineers and technicians most likely have undertaken efforts to create a defensive system against these regional ballistic missiles. The knowledge and experience that they would gain in joining the US SDI development should prove of great assistance in designing and producing their own anti-missile defense systems.

For its part, Brazil is undertaking an ambitious space plan that includes such projects as building and launching its own weather satellite aboard a booster manufactured at the country's aerospace technology center. It also might continue developing advanced communications satellites similar to Brazilsat I and II. Brazil plans to modify a satellite testing laboratory to stimulate interest in space, to fashion a space solar observatory platform, and to construct a smaller-scale telescope similar to NASA's Hubble Space telescope.<sup>7</sup>

Brazil's Specialized Engineers Inc. has developed a new anti-tank missile with a laser range

finder. This missile will be fitted to the Cascavel armored car and the Osorio heavy tank by 1987. Engesa is scheduled to introduce a light tank that will run on tracks and another medium wheeled tank.<sup>8</sup> Quite likely, technical information derived in these efforts could be applied in developing other armaments.

In some cases, importing and exporting nations prefer that arms transactions remain secret. Although for several years there have been scattered reports that Israel was exporting weapons to the People's Republic of China (PRC), it was not until the disclosure in November 1986 that the United States had shipped arms to Iran through Israel that press accounts began to refer to Israeli arms exports to the PRC. Some reports suggest that Israel has exported from \$1 to \$3 billion worth of military equipment to Communist China.<sup>9</sup> The Chinese have long been impressed with Israeli arms. They especially want to tap Israel for the knowledge and hardware that succeeded so well against Soviet military equipment during the war in Lebanon. Reportedly, Israel has supplied the PRC with electric fire control systems and nightscopes for tanks, the 105mm cannon for Soviet tanks, communications equipment, and radio systems. Evidently, Israel has sent scientists to China and both countries have sent trade missions to each other. These closer ties and arms sales have not induced the PRC to abandon its public opposition to Israel, necessitated by its position in the Third World.

In a shift of policy, the United States is allowing India to gain access to US defense technology. US leaders have indicated a willingness to sell technology for tank warfare and testing of missiles and India

plans to buy other advanced technology from US contractors for use in its own weapons development. The Indians also seem prepared to use General Electric jet engines in developing the new generation of indigenously designed and produced combat aircraft.<sup>10</sup> Acquiring such advanced US technology should assist India in its plans to modernize its armed forces.<sup>11</sup>

Sometimes the United States purchases advanced weapons from some of these newly industrializing states. For example, the United States signed a contract with Israel in 1986 for the sale of remotely piloted reconnaissance aircraft. The US Navy bought the Israeli weapons after prolonged competitive bidding and a series of exhaustive tests.<sup>12</sup> The United States also purchased some Kfir fighters from Israel to be used to simulate Soviet aircraft in naval exercises.

### Upgrading Existing Weapons

Newly industrializing nations can employ resources for industrial activities to produce components rather than whole, finished military items. Specifically, for many years a few of these countries have upgraded either their own weapons or those that they imported from major suppliers. For the most part, those countries now manufacturing military hardware first overhauled and repaired their own weapons or those of others. By the 1960s Israeli industrial facilities, under contract to the United States, repaired and overhauled some US aircraft and other military equipment, thereby gaining valuable experience. As already mentioned, Israel also

shared with the United States improvements that Israeli engineers had made.

Given the current steep rise in the cost of weaponry, in many cases upgrading older equipment makes more sense than buying new arms. Through modernization, newly industrializing countries can increase the service life of existing armaments. Thus, they can reap the benefit of reducing the need to import expensive weapons, and lessening the requirement for building facilities to manufacture newer arms locally. In short, upgrading existing arms offers a sensible way of gaining more effective arms at less cost. However, even to upgrade weapons, a country must first develop a significant industrial base.

For example, the Israelis are replacing the J79 (General Electric) turbo jets with a more effective Pratt & Whitney PW 1,120 powerplant in the F-4 Phantom jet aircraft.<sup>13</sup> The Israelis will extend the life span of the aircraft considerably as well as replacing the wiring, the fuel lines, and any item with a limited life. The F-4 update version will give a 33 percent faster climb; 20 percent faster accelerations; 20 percent faster and tighter sustained turn, and 19 percent greater range. Structural modifications are expected to add about 15 years to the Phantom's operational life. All in all, the Israelis will have a workable fighter aircraft that can perform many needed wartime tasks and achieve all this at less cost than purchasing new equipment.

Other newly industrializing countries seeking to modernize older weapons include India, Brazil, and South Korea. India made major changes in the British Vickers 37 Main Battle Tank and called the

new version the Vijhyanta. Brazil has modified the US M3 Stuart tanks to develop a more modern X1A1 light tank. South Korea is considering refurbishing its aging fleet of F-4C and F-4D aircraft with new avionics and engines instead of buying a new aircraft elsewhere. The South Koreans also have begun a product improvement plan to upgrade their US-made Hawk air defense missiles. The aforementioned examples of upgrading certainly are not exhaustive. However, they do show how, at the present time, national and military leaders in a number of countries are opting for modifying existing arms.

Nonetheless, the newly industrializing arms producers face a continuing technological issue that transcends the problem of marginal technological upgrading. Some of these arms manufacturers deliberately opted to build weapons of middle and lower-technology. This discussion previously noted that Engesa in Brazil consciously designed its armored vehicles with this concept in mind. Engesa believed that such hardware would serve the military needs of Third World nations. However, a technological ratchet effect seems to be taking place that induces arms producers toward ever higher technologies.

First, some newly industrializing countries, such as Singapore and Korea, are now capable of manufacturing computers as well as electronic systems and components, technologies used in modern fire control systems. Manufacturers of low-and middle-technology weapons feel compelled to raise the technological ante in order to maintain their market position. Secondly, the Third World buyers seem inclined to ask for more highly advanced weapons as

the character of actual or potential warfare changes. Both Iraq and Iran, over the years, have sought to employ more sophisticated arms. In the future, lower technology weapons might become more difficult to export. Finally, within newly industrializing countries military officers, scientists, and engineers associated with ministries of defense have become a potent lobby, advocating a move to more advanced weapons. As a result of these forces, an impulse toward higher technology could become widespread. In Brazil, for example, the Osorio tank seems to be moving to increasing technological complexity as did Israel's Merkava tank some years ago. In the process, greater risks often accompany the move to higher technology. As their weapons become more advanced, the newly industrializing countries increasingly will have to compete with the advanced arms producers, probably diminishing their export potential.

Another technological issue facing arms manufacturers in newly industrializing lands relates to the difficulty of modernizing production processes. The people most conscious of antiquated production methods and equipment are those on the shop floor. They feel most keenly the lack of such technologies as computer assisted machine tools. As a rule these technicians hate their government protectionist technology policies that prevent them from acquiring more modern production technologies.

## 7. NATIONAL SECURITY IMPLICATIONS

The growth of arms manufacturing by newly industrializing countries affects US national security interests by making it either easier or more difficult for US leaders to achieve their global or regional objectives. Former Secretary of State George Schultz aptly summed up US aims in stating that the United States wants to help "shape a peaceful and secure international order for the remainder of this century and beyond."<sup>1</sup> Specifically, the United States wants a world composed of independent states, whose people have a voice in their own destinies. This nation desires to achieve a peace, but not a peace that results from Soviet domination. It also prefers to see nations grow more prosperous *through participating* in an open international trading system.

Arms production in Third World countries thus has both a national security and an economic dimension for the United States. Before examining the national security aspect, the international economic dimensions merit brief comment. Third World countries are increasingly important to the United States because of the growing interdependence in economic relations among almost all nations. Such

countries now receive about 35 percent of US exports, more than the European Common Market and Japan combined.<sup>2</sup> The United States believes that developing countries can increase their living standards by achieving sustained economic growth. Proponents of arms sales assert that growing arms industries contribute to creating new wealth. On the other hand, critics prefer that Third World countries look to non-military commercial ventures to achieve economic goals.

The arms trade conceivably could contribute to international violence. French arms deliveries to the Middle East, it has been argued, could frustrate the search for peace in the area.<sup>3</sup> One might contend that if importing finished arms exacerbates political relations, aiding nations in the region to develop domestic arms production is even more unsettling. A proliferation of arms production can only increase the chances for turmoil and, possibly hostilities in sensitive parts of the world.

An opposite view holds that arms transactions could have a deterrent effect, inducing regional powers to avoid armed hostilities. Former President Reagan overturned former President Carter's policy of reducing arms sales because he believed in the deterrent potential of military might.<sup>4</sup> The large arms inventories of Israel and South Korea certainly contribute to convincing neighboring Arab states and North Korea to think twice before attacking.

Most nations would not accept the argument that importing finished weapons from the major producers inevitably leads to stability while building up their own domestic arms production must lead to turmoil or war. They most certainly would reject

this double standard, interpreting it as unfriendly. Some Third World countries would call it imperialistic. One can assess the relationship between arms production and stability (or instability) only on a case by case basis. The specifics of the situation would tell US policymakers whether to assist newly industrializing, or any country, for that matter, to build or expand an indigenous arms industry.

The growth of arms manufacturing worldwide apparently has not yet significantly affected the US defense industrial base adversely. Of this nation's workforce in 1975 only some 3 percent related to the export of arms. Of the top ten arms manufacturers in 1977, only one, Northrop, counted on foreign sales for some 25 percent of its business.

The United States has concrete military objectives in the various regions of the Third World. In East Asia and the Pacific, this country seeks to maintain the security of the essential sea lanes, to prevent communist states of the region from interfering in the affairs of others, and to maintain a valuable relationship with the PRC. In the Near East and Southwest Asia, it wants to preserve and protect the independence of the states in the area, including both Israel and friendly Arab states. In the Western Hemisphere, our national leaders aspire to maintain the security of the North American continent, the Caribbean Basin and the Panama Canal, and to counter communist influence in the region. In Africa we seek to uphold friendly countries threatened by communist subversion and support stability on the continent. In addition, we aim to maintain transit rights for the deployment of US forces, if necessary.

Of course, the United States also works to limit or eliminate Soviet (and Cuban) penetration in Africa.<sup>5</sup>

### A Question of Hegemony

Some aspects about the proliferation of conventional arms manufacturing in the Third World merit examination. The United States seeks to prevent any country from achieving hegemony, either globally or regionally, and aims its huge national security investment for the purpose of thwarting any Soviet preponderance of power. The United States also wants no hostile regional power, especially one able to supply its own arms, to assume hegemony in critical parts of the world. Iraq attacked Iran because of a desire to gain hegemony in the oil-rich Persian Gulf area. Yet, Iraq depended on imported arms to carry out its ill-fated ambitions. We are left with the question: How could the arms production programs of newly industrializing countries affect regional power balances?

Why has India put great effort into building a domestic arms industry? Indians frequently use the term "great power" to describe their country's regional role. India does desire a power projection capability in the Indian Ocean as well as regional power dominance. Although India continues as the most potent power in South Asia, it still has not gained hegemony. Pakistan certainly does not follow Indian policies. Just how much India can expect to improve its power position in South Asia through increasing indigenous arms production remains uncertain. We can be sure that India desires to be self-sufficient in arms production, but the Indians realize

that they will require outside foreign assistance well into the future.

The Republic of South Africa also enjoys dominant military power in its part of the world. It is the only country in southern Africa that supports significant defense industries. South Africa's black neighbors certainly possess no industrial capacity that could challenge South Africa. Yet, the South Africans cannot always have their way in southern Africa. For example, they cannot eject permanently hostile black national movements from bordering countries. South Africa's successful defense industries have not brought it hegemony in the region.

The Brazilians have a mind-set that vigilant preparedness and military strength offer the key to stability, power, and prestige. Whether Brazil is intent on ultimately securing dominance in South America remains a moot point. In light of Argentina's well publicized problems, it is argued that Brazil has surpassed its traditional rival. However, there is scant evidence to support the contention that Brazil actively seeks hegemony on the southern continent and it is unlikely that Brazil's domestic arms production will make that nation dominant over its neighbors.

On the other hand, in an increasing number of cases, newly industrializing suppliers have come to provide a large portion of their neighbor's weapons creating dependencies on the seller. In the process the exporter gains political influence. Brazil's exports to Paraguay illustrate such a case. Most of Paraguay's tactical fighters, trainers, and transport aircraft come from Brazil, including some converted Cessna, Xavante, Aerotec Uirapuru, Bandeirante

transports, and Helibias Esquilo helicopters. Paraguay is a good example of a recipient country swinging from the orbit of one supplier to another, in this case from Argentina to Brazil.

In other instances, a newly industrializing supplier far away also can provide a large portion of a small nation's military inventory, gaining influence thereby. For example, Israel has sold Honduras much of that Central American state's military equipment, including Mystere fighters and air-to-air Shafrir missiles. In addition, all of Honduras' mortars and recoilless rifles were manufactured in Israel. Honduras's armored cars were built at the Ramta Structure and Systems of Beersheba. The Israelis also have provided the Honduran armed forces with some of their rifles and submachine guns.

In the cases of Paraguay and Honduras, though neither a neighboring state nor a far distant supplier gained hegemony, the important point is that Third World nations are beginning to acquire influence in other Third World nations through the sale of arms. A Third World nation with even a limited production of military items could meet the relatively modest needs of other Third World countries. As this possibility increases, the overall importance of defense production in newly industrializing countries should grow and possibly diminish the value of US arms sales and political influence abroad.

Although Israel appears the most militarily potent nation in the Middle East, even with its wide ranging and high technology arms production, it still cannot have its will in the region. There are many factors that the Israelis would change if they

could, such as getting rid of the Palestine Liberation Army (PLO).

Both Argentina and Brazil seem determined that the other will not achieve hegemony over the countries of Latin America. Fearing the possible consequences of developing nuclear devices, both countries have slowed down their nuclear development. In August 1986, Brazil postponed plans for reprocessing spent fuel to obtain weapons-grade plutonium. Although the Brazilians seem to have made strides in uranium enrichment outside international safeguards, its leaders appear to be easing the pressure to beat Argentina to an atomic bomb. In 1986 President José Sarney of Brazil and President Raul Alfonsín of Argentina signed an agreement intended to avoid a replication of the India-Pakistan style nuclear rivalry between neighbors.<sup>6</sup>

However, the potential for regional and internal conflict remains. Insecure during past decades, Argentina acquired military supplies from Panama and Venezuela and the Argentine air forces bought Mirage jet fighters from Peru. In reality, Brazil neither confronts a realistic threat from Argentina nor seems to have aspirations for gaining hegemony in South America. It does seek greater recognition as a growing modern power, but shies away from gaining actual dominance over the continent. Thus, it seems that although a low-key, conventional arms rivalry may currently exist between these nations, each country's expansion in domestic defense manufacturing capability does not strike fear in the heart of the other. Brazil, especially, shows little concern because its defense industry is many times the size of Argentina's.

Every case discussed reinforces the validity of one overriding fact—greater self-sufficiency in arms production has not yet given, and in the foreseeable future is unlikely to give, any nation the opportunity to gain hegemony in its region. The spread of arms production might alter power relationships, but up to now it has failed to elevate one state to true dominance in any part of the Third World.

### Question of Stability

The United States prefers that all countries abide by principles of acceptable behavior. Acts which deviate from acceptable behavior create instability. The United States wants a stable world in which orderly progress assists nations to improve their lot. The United States especially dislikes local wars, civil disturbances, and revolutions conducted by anti-democratic leftist radicals. Such instability often proves inimical to US interests.<sup>7</sup>

Unfortunately, in the foreseeable future, the US realistically cannot expect the disappearance of international wars and internal insurrections. Thus, Third World nations have little option but to buy arms or to manufacture them domestically. Clashes between ethnic and religious groups, between governments and rebels, between opposing ideologies, and between competing claimants for disputed territories seem certain to remain.

By retaining their manufacturing capability new weapons producers potentially can alter the character of a war. The problem for the United States is to determine if the proliferation of arms industries will prove stabilizing or destabilizing in any particular region. If regional arms production races were to upset

regional stability, US interests would not be served. However, stability obviously depends on a host of political, economic, social, and psychological factors, and not solely on arms supply. For example, South Korea's new arms production has not appreciably heightened tension on the peninsula. In supplying South Korea with the means to increase domestic arms production the United States seeks to avoid the growth of North Korea as a dominant power on the peninsula.<sup>8</sup> Here again, the substantial US commitment to aid South Korea works to maintain the status quo, triggering no upset in the balance of power between North and South.

We also mentioned that Brazil's arms program has not intimidated its neighbors. Certainly, we cannot predict the future: if Brazil and Argentina were someday unexpectedly to intensify their rivalry for leadership in Latin America, their respective arms manufacture and export abilities might affect the outcome.

ASEAN nations like Thailand, Singapore, and Malaysia had opposed India's recognition of Vietnam's position in Kampuchia. However, India's efforts for increased arms production at home seem to have little impact on this situation. On the other hand, a growing domestic arsenal in India has relevance for its other neighbor, the People's Republic of China (PRC). Ever since the two countries fought in 1962 the Indians have increased military readiness near the common border. Although that boundary has remained quiet for years, the PRC, like Pakistan, probably feels concerned about any industrial growth that would give the Indians greater military strength and flexibility in the unlikely event that

armed hostilities should again erupt. However, the important point is that, despite increased defense production by the two sides, Indian-PRC relations have proved stable over a long period of time.

The Arab-Israeli confrontation proves most instructive about the relationship between defense production and stability. The Israelis and the Arabs have been fighting since 1947 (and even longer if one considers the days of the British Mandate). They fought when each had to import all or most of its arms and they fought when the Israelis could supply much of their armaments and when Egypt and Syria depended on Soviet arms.

Yet, one cannot say that if one side or the other does or does not produce all its own weapons, the region would enjoy more stability. One might argue that Israel's ability to produce a high percentage of its weaponry has given Israel greater freedom of action, making it less susceptible to US desires and constraints. In addition, Sadat made peace with Israel at a time when Egypt's embryonic domestic arms industry was dependent on Soviet supplies.

#### Soviet Arms Production Assistance

The question of stability also relates to the size and composition of Soviet arms sales to Third World countries. In 1984, Soviet arms deliveries to the Third World totaled an estimated \$9 billion. In contrast, US Security Assistance amounted to \$6.5 billion, roughly half of which went to Egypt and Israel. Except in the case of India, the Soviets have not helped their customers to build arms industries that would include the manufacture of Soviet designed weapons. When the Soviets were Egypt's prime

arms supplier, they did not help Egypt in any major way to build its own defense industry. Likewise, the Soviets have done almost nothing to aid arms buyers such as Iraq, Ethiopia, Syria, South Yemen, Angola, or even Cuba to become even modest arms producers.

It should be noted that many of the buyers of Soviet arms lack the industrial infrastructure even to maintain and modify Soviet military equipment, let alone to manufacture it. Yet, some recipients of Soviet arms have local industries that could help build components. The Soviets evidence little interest in helping them to do so. The reason for Soviet reluctance to sell manufacturing capabilities to its arms customers stems from the simple fact that the more these buyers can manufacture their own spare parts, components, and whole weapons systems, the more difficulty the Soviets face in controlling or influencing their behavior. The Soviets desire to retain a realistic veto over the ability of its friends and allies to conduct war.<sup>9</sup>

In an exception to this rule, the Soviets have provided India with the knowledge and means to manufacture Soviet military equipment. When the Indians first purchased the MiG-21s, for example, the Soviets exported the needed technological knowledge and sent Russian technicians to assist the Indians in building and operating the production line. At the same time, Indian technicians went to the Soviet Union to gain the know-how of MiG-21 production. Why would the Soviets agree to such terms? First of all, the Indians insisted on them, and India was valuable as a counterweight to the PRC. India also possessed a fairly large pool of engineers

and technicians who could absorb Soviet technical know-how within a relatively short time. The Indians built an entirely new industrial complex for manufacturing the MiG-21. It is interesting to note that India no longer depends as heavily on Soviet assistance for gaining a manufacturing capability for arms. It now feels confident to manage such production itself. In 1985, India signed a multimillion dollar contract with the Soviets for purchasing Ilyushin transports and it also purchased training and a spares manufacturing capability from Russia.

### Technology Transfer

No issue has influenced US attitudes toward the proliferation of conventional arms production more than the control of critical technology exports. Through espionage and other investigatory activities the Soviets have tapped US technology to improve their weapons. US officials have listed a large number of improvements in Soviet weaponry that can be traced to incorporating unauthorized US technology. One study asserted that Western microelectronics know-how enabled the Soviets to build a modern microelectronics industry, key to the future modernization of Soviet arms. Moreover, Soviet Ryad computers are patterned after IBM 360 and 370 mainframe computers purchased in the West.<sup>10</sup> As newly industrializing countries improve the effectiveness of both their defense manufacturing process and the weapons that they produce, the Soviets no doubt will focus more of their industrial espionage efforts on these countries.

International technology transfer occurs when one country sells or gives to another country the

know-how to make products, including specific military items. More precisely, the flow of technology usually takes place between industrial enterprises in each country. In addition to espionage there are quite a number of legitimate means by which such information moves. For the most part, the instruments of transfer include technical information documentation, reports, test data, and blueprints, training, exchange of scientists, engineers, and managers, sale or exchange of patents, technical publications of trade magazines or of professional societies, consulting firms, and industrial fairs.

The most effective means of transferring technology is person-to-person contact. At times, even if the seller provides the buyer with all the documentation associated with a specific transfer, in order to make a transplanted production facility work at optimum efficiency or even work at all, it is necessary to convey idiosyncratic information not contained in the documentation. More frequently than one might expect, the successful operation of even a turnkey plant (a complete manufacturing plant), which requires full technology disclosure, may depend on a unique experience or action taken by a line worker or a managing engineer at the seller's plant.<sup>11</sup> Workers or managers might alter certain production functions of machine tools in a peculiar way. Perhaps the seller's metallurgist devised some ad hoc mixture of alloys, or tinkered with the time required to heat a metal. These actions usually do not appear in the instructions that the buyer receives. Consequently, the seller of a turnkey plant frequently sends technical representatives to the new production facility in order to acquaint foreign personnel with the quirks of

the exported production facility. Without this highly personalized form of technology transfer, the ability of buyer nations to absorb the new technology remains limited.

Two major questions confront US decisionmakers: Will nations receiving US defense manufacturing know-how inevitably become fierce competitors in the international arms market? Will US defense production technology acquired by newly industrializing countries leak to unauthorized countries, contributing to the military strength of potential enemies?

US defense leaders and industrialists worry lest the United States provide foreign companies with advanced weapons designs and technologies that one day will enable them to beat out US arms firms in the highly competitive world arms market. Of equal concern, they fear that the decision to open the US defense market to foreign firms will give an edge to those foreign companies which have received infusions of US technology. The critics argue that it would be ironic if foreign, rather than domestic firms, should win contract bids because of the technological assistance they had received from other American companies. Obviously, US defense contractors view such a development with hostility.

Experience in the international arms market supports the assertion that newly industrializing countries have not become and in the near future probably will not become potent competitors in high technology arms sales to the United States or Western Europe. For the most part, newly industrializing countries export arms of middle or low technology. Weapons exported by South Korea and Brazil are of

this variety. Only Israel can export significant numbers of high-tech components. It is doubtful that newly industrializing countries will become major exporters of advanced aircraft or missiles, as well as detection and communications equipment in the near future. However, the armed forces of many countries throughout the world are perfectly willing to buy and use middle technology weapons, as demonstrated by Iraq's purchase of Brazilian armored cars.

Of even greater concern, US know-how made available to newly industrializing countries could leak to communist nations. For example, in 1985 Iran reportedly flew an F-14 fighter that it had received from the United States during the Shah's regime to the Soviet Union for examination and testing. Soviet technicians no doubt took advantage of this opportunity and scrutinized this modern US fighter.<sup>12</sup> In this instance, the product rather than production know-how became available to the Soviets.

The leakage of production know-how could prove just as damaging because the Soviets could apply such knowledge to a variety of weapons manufacturing activities. In 1986 India and the United States initiated talks about possible Indian purchases of American military technology. US officials still worry about New Delhi's close ties to the Soviet Union. They fear that the Soviets might use their considerable connections to India's defense industries to learn more about American arms production should India commence either a licensing or coproduction project with the United States. Reportedly, the Soviets already have planned massive imports of engineering goods from India.<sup>13</sup> Most likely, India

will have to sign security agreements before the United States consents to send it technical information about arms and arms production.<sup>14</sup>

The United States has fashioned a general policy toward the spread of defense production among allied and friendly countries, emphasizing feasible and sensible middle options. In 1984, former Secretary of Defense Caspar Weinberger notified Congress that:

The basic reason of our international cooperation and technology transfer policy is for US, allied and friendly nations' forces to attain, through equitable burdensharing, the necessary military readiness, sustainability, and interoperability to defend our common interests and preserve peace throughout the world. Our intent is to help allied and friendly nations strengthen their military and *defense industrial base*, which in turn enhances our mutual efforts to establish a formidable defense posture to deter aggression.<sup>15</sup> (Italics added).

The question of unauthorized US technology transfer has spawned a considerable amount of spirited literature. After World War II the West established COCOM, an international body devoted to preventing member states from exporting technology that would aid the Soviets in their military buildup.<sup>16</sup>

While knowledgeable observers agree that the Soviets are acquiring technology in the West that helps them in their military programs, the extent of such pilfering and its impact on the technological

and military balance between the superpowers remain a matter of debate. Some civilian analysts assert that government spokesmen have overstated the adverse impact of such transfers. At most, it is argued that the Soviets have gained some moderately important technologies although, at times, they have been unable to absorb even these.<sup>17</sup>

In considering whether to export arms manufacturing knowledge, US decisionmakers must answer a fundamental question: Are the chances of leakage from newly industrializing countries greater than from advanced allied and friendly nations? The United States has expressed doubts about the effectiveness of the control machinery in newly industrializing nations on the Pacific rim of Asia and has asked these nations to tighten their protective measures.<sup>18</sup> US officials must judge the strength of technology controls of newly industrializing nations on a case by case basis. If a country lacks the degree of protection we feel is necessary we might either sell it only older arms or demand written assurances from recipient countries that they will take every measure possible to safeguard highly sensitive information. Up to now, the question of technology controls in newly industrializing nations has not proved a major impediment to US security assistance support for defense industries in some newly industrializing countries.

The United States enjoys an important advantage. High technology weapons produced by newly industrializing countries under security assistance from the United States will contain American technology in, for example, jet engines and composite materials. US defense technology overall enjoys a

solid reputation and many developing countries prefer to use US components in building their more sophisticated weapons, even knowing the United States can veto sales to third parties. Thus, US defense firms would confront potent competition in advanced weapons containing US technology *only* if the US government permits sales to third parties by special agreement. The United States, therefore, has to make a conscious decision about "third party" sales before granting new technology to industrializing countries.

Above all, to ensure that unauthorized technology transfers from any source will not damage this country's military posture, the United States should continue to conduct a vigorous R&D program. All the technology controls in the world, including those affecting newly industrializing nations, cannot prevent the Soviet Union from eventually gaining any technology that it determines to learn. If the Soviets lavish enough resources in any technological field, they are bound to develop on their own the specific technology that they seek. Transfer controls can do nothing more than delay Soviet acquisition of such knowledge and make it more costly. Any technology export controls that the United States imposes in regard to newly industrializing countries must be viewed in this light.

### Security Assistance

Security assistance, of course, constitutes a key link between the foreign and defense policies of the United States. It has become a cornerstone of this country's national security policy, intended to enable the United States to cope with several serious challenges including:

- the expansionist and destabilizing behavior of the Soviet Union;
- external and internal regional tensions and turmoil caused by the Soviets and their allies;
- violent terrorism and insurgency;
- basic indigenous political, economic, and social problems of Third World countries; and
- peacekeeping operations.<sup>19</sup>

Given these objectives, it is not surprising that security assistance relates directly to the growth of arms industries in the newly industrializing world.

Through its security assistance program the United States supports two major types of arms transactions associated with newly industrializing countries. First, it sells outright, provides credits for and provides free grants of finished military items. Second, it strives to relieve the economic pressures on arms importers by agreeing to various forms of offsets.

The United States sells military end products such as fighter aircraft, armored cars, tanks, missiles, munitions, naval ships, radar systems and similar items. Through such transactions a buyer gains a minimum of manufacturing know-how but can learn about operating and maintaining new weapons. While securing this latter knowledge is indispensable for conducting military operations, it does little to help a country build a production base. In some cases, the buyer can reverse engineer the military item. Yet, this task proves formidable for many developing countries which lack the infrastructure and skilled talent needed to reverse engineer a complex end item.

The sale of finished weapons proves attractive to US businesses. Exporting whole units, such as fighter aircraft and missiles, can earn US defense industries a better profit and create more jobs, as well as recouping some of the R&D costs associated with the development of a weapon.

The United States delivered \$11.7 billion of defense articles and services to foreign countries during fiscal year 1986.<sup>20</sup> In that same year the United States provided \$5.7 billion in military sales financing assistance to needy friends and allies. Of this \$5.7 billion, two-thirds was extended as grants (chiefly to Egypt and Israel) and the remainder was composed of loans at market or concessional rates of interest to countries in a position to repay.

As the more credit worthy countries have "graduated" from US assistance, the US aid program has become mostly a sales program with some concessional interest rates and loans.

Executives of US defense industries argue that foreign sales improve the nation's industrial base by lengthening production runs, thereby reducing unit costs. Such sales help sustain US industrial facilities that otherwise might have been shut down. More than one third of the 150 F-15 aircraft that the United States planned to produce were destined for Saudi Arabia.<sup>21</sup> The sale of such finished military units in the foreseeable future would not normally provide the know-how that would enable importers to become serious competitors of the United States in the world's arms market.

In some cases the United States has refused to sell particular weapons to certain countries. For example, in a 1982 accord with the PRC, the United

States pledged itself to reduce arms sales to Taiwan. In fact, since 1982 the United States has cut direct arms sales to Taipei by some \$20 million a year. US decisionmakers have refused to sell Taiwan F-16 or F-20 fighter aircraft because such a sale would violate the 1982 agreement.<sup>22</sup> Controversy exists as to the reduction of the United States commitment to Taiwan. In any event, American defense industries expend a great deal of time and money in trying to convince arms importers to buy their wares.

Over the years, arms transactions have increasingly come to include offset arrangements. Arms importers who a decade or two ago were quite willing to buy the complete weapon from a major supplier, now insist that arms deals help reduce the cost of foreign exchange or produce revenue for the importing country. If the importing nation has any semblance of local industry at all, it insists that its plants perform some of the work. As Michael Klare has noted, " . . . many Third World Governments now request that all major arms-import transactions allow for at least some coproduction or assembly work in (local) defense factories."<sup>23</sup> Every potential arms customer who has a need and desire to develop its indigenous industry to soften the economic impact of arms imports, will insist on some degree of local production of components or a commitment to sell some civilian product manufactured in the country of the buyer.

US industrial firms have found that offsets are simply the price that they have to pay for doing business in many countries. For example, McDonnell Douglas has agreed to steer \$500 million in US tourism dollars to three countries which have bought its

F-18 jet fighter. This firm also received a large supply of Yugoslavian wine and hams which it gave to employees for Christmas. General Electric and Rockwell International have set up extensive international trading operations to handle the offset agreements. Formerly, offsets averaged about 10 percent of the value of arms, but they now often exceed 100 percent.<sup>24</sup> Offset arrangements usually include one or more of the following terms of trade: licensing production; coproduction of US weapons designs; supply of whatever items a local economy can produce.

Licensing offers a convenient way for a supplier to sell its know-how. About 35 percent of Israel's electronics manufacturing results from licensing arrangements from the United States. South Africa is now producing a modified version of the French-designed Mirage aircraft, which they call the "Cheetah." Argentina is now attempting to build a tank under a license from Thyssen Henschel of West Germany. India produces MiG aircraft under a license from the Soviet Union and, under a license from McDonnell Douglas, South Korea builds the F-5. The Koreans also are manufacturing under license 5.56mm rifles from Colt Industries in the United States.

In granting licenses the United States, in effect, transfers know-how that enables foreign industrial enterprises to manufacture a military item. Thus, the Korean Airlines learned a great deal about manufacturing military aircraft from its licensed production of Northrop's F-5E fighters. Likewise, Taiwan gained important knowledge from its licensed production of the Beech T-34 Mentor training aircraft.

Israel has benefited by manufacturing the GBU guided bomb under license from Rockwell International.

As long as newly industrializing nations lack their own weapons designs, they will continue to gain substantial knowledge from major arms suppliers. Manufacturing licensed technology also offers an attractive way for a foreign country to build up its domestic arms industry. Furthermore, licensing enables an importer to avoid a good deal of the expensive R&D efforts that accompany the development of any weapon.

Sometimes, exporting nations allow the purchaser of a license to manufacture some of the latest designs of the seller. For example, Brazil has manufactured the Cobra 2000 antitank missile under license from the Federal Republic of Germany; South Africa manufactures Israel's Gabriel missile under the label of Skorpion, and Taiwan produces the Hsiung Feng antiship missile, also a version of Israel's naval Gabriel missile.

To some countries enjoying an advanced industrial base, coproduction offers an attractive way to gain access to advanced know-how. Most coproduction arrangements take place between technologically advanced enterprises. The most celebrated coproduction venture is between the United States and Belgium, the Netherlands, Denmark, and Norway for manufacturing the F-16 fighter. In this instance, the United States promised to provide its West European partners all the technological knowledge associated with this aircraft. Because both the supplier and buyer are simultaneously manufacturing this military item, the buyer enjoys learning

about advanced state-of-the-art technology. As a result, newly industrializing nations also eagerly seek coproduction of advanced weapons with the United States, France, or Great Britain. At other times, the buyer must settle on a somewhat less up-to-date model, as when in 1979 the United States approved South Korea's request for coproducing the older F-5 aircraft with Northrop.

Major arms suppliers naturally prefer to sell foreign nations finished military products. Their tasks are easier when all the components are made in the exporting country and the weapon is assembled there. However, exporting countries are apt to agree to a coproduction arrangement if the importing country insists on such terms and has the local productive capacity and security capability to perform its manufacturing responsibilities. Some newly industrializing countries have a capacity not only to produce components, but also to assemble finished military products as well.

In a few instances the United States has struck such coproduction deals. As we previously noted under the agreement with Northrop, Korea agreed to build 30 F-5Es and 32 F-5Fs locally at a cost of \$68 million. Taiwan also is coproducing the F-5 with United States' approval. In 1986 the United States and Israel began negotiations to link the two countries in developing and manufacturing small missile boats loaded with electronic and combat equipment, a secret decoy drone used with dramatic success by the Israelis in Lebanon, and diesel submarines for the Israeli Navy.<sup>25</sup> Recently, additional countries such as Egypt, Pakistan, Saudi Arabia, Singapore, and Thailand have expressed an interest in sharing

the production of weapons with the United States. Saudi Arabia reportedly has created a publicly held industrial development as a major initiative to promote joint businesses with the US aerospace industry. The Saudis view this venture as an offset instrument.<sup>26</sup>

In addition, newly industrializing countries also seem determined to take advantage of the US government's decision to open up the American market to friendly foreign arms suppliers. For the most part, newly industrializing countries have met this opportunity by becoming subcontractors and vendors to US prime defense contractors. Thus, South Korean firms are providing Bell Aerospace Texton with spares applicable to radar warning as well as spares for an ammunition loading system being produced by Colt Industries. An Israeli firm is working with McDonnell Douglas to sell B-300 assault weapons to the US Marine Corps and another Israeli company won a contract to provide the United States with AN/VCP-12 radios. A Taiwanese firm is selling Northrop 130 line items for spares applicable to a target-identification-set, electro-optical system for the F-14 aircraft. Obviously, by undertaking subcontract work, the industries in these competing countries hope to acquire some state-of-the-art technology.

A more limited amount of production also is carried on between newly industrializing countries and between less developed and newly industrializing countries. Brazil's Embraer has an agreement with Egypt for coproduction of the EMB 312 Tucano trainer aircraft. In mid-1983 the Egyptians agreed to a coproduction venture with Romania on the construction of the TR-T7 tank. In the foreseeable future coproduction deals between such countries will continue and perhaps grow.

## 8. FOREIGN PROCUREMENTS DURING US MOBILIZATION

**T**his chapter explores the problems associated with the US purchase of arms from newly industrializing Third World countries in case of a mobilization emergency. Prudent action demands that the national security community of the United States should plan for all conceivable contingencies, and the outbreak of a sizable conventional war obviously would prove to be such an event.

*Major premise:* The United States will not spend the funds or expend the resources in peacetime needed to build up its munitions base to the capability of fully meeting the nation's wartime requirements. This premise is based on the estimated high rates of munitions expenditures projected for a conventional war.

*Minor premise:* Newly industrializing countries now support a significant arms manufacturing industry.

*Conclusion:* In the event of a sizable conventional war, the United States would look to the munitions

production of allied or friendly, newly industrializing countries, especially in the early weeks or months of the conflict.

For over forty years the United States and the Soviet Union have avoided unleashing a nuclear war. Moreover, this nation also has escaped fighting a conventional war with the Soviets. Yet, since the end of World War II the United States has fought two major limited wars (Korea and Vietnam) and several minor engagements (Dominican Republic, Grenada, and Lebanon). It is simply prudent to prepare to fight the kind of war that the United States has actually fought in the past forty years and is most likely to confront again. Consequently, this nation should conduct some planning and allocate resources to meet the demands of a relatively long conventional war.

The United States prepares its military forces for possible combat by allocating limited resources either to force structure (the size, number, and composition of existing peacetime military units), to modernization (designing and building the most technologically advanced weapons), to readiness (ensuring that the existing forces constitute as effective a fighting force as possible), and to sustainability (giving these and additional forces the wherewithal to endure on the battlefield). The major ways of attaining sustainability are through surge and mobilization. Surge refers to maximizing production expansion within the existing defense manufacturing facilities, with no *augmentation*. Mobilization, on the other hand, refers to the process that the nation undertakes to assemble the existing and additional resources to conduct a sizable conventional war. This

*augmentation* of manpower and industrial resources is intended to provide US fighting forces with staying power.

In reality, compared to the amount of resources that force structure, modernization, and readiness gain in peacetime, sustainability and mobilization receive a relatively low priority. The greater the threat to the United States, the more the US government is willing to increase the flow of resources to *sustainability* and *mobilization*. When the threat appears neither imminent nor grave, the country adopts only the inexpensive options. Although the Reagan administration did not lavish resources on either sustainability or full mobilization, it improved in a discernable way the nation's potential in this field. For example, our munitions base profited from increased expenditures, leading to improved inventories—at least for the peacetime forces. The key argument advanced here asserts that if someday the United States finds itself in a conventional armed conflict on the scale of the Korean War or larger, it would have little choice but to try to procure compatible munitions from foreign sources in order to avoid a military catastrophe.

Twenty-five years ago only the United States and some Western European countries manufactured meaningful quantities of arms in the free world. We have noted that since the 1960s, a number of countries, especially in the Far East, but also in South America, Africa, the Middle East, and the Pacific region have built up sizable munitions industries.

Although in a crisis the United States probably could tap some of these new foreign sources of munitions production, it would confront formidable

problems in acquiring such defense items. Those arguing against foreign procurements, even in the case of US involvement in a sizable war, prefer to call on the United States to commit vast resources in peacetime to construct a domestic munitions production base capable of taking care of any eventuality. Unless a dramatic shift occurs in public opinion, Congress most likely would not appropriate the huge sums needed for this purpose. In addition, for the United States, the option to buy abroad does not represent a preferred or politically acceptable course of action. Instead, foreign procurement would constitute the practical step that the United States might be forced to take reluctantly were it to have to fight a large-scale war.

It is important to note that the idea of tapping foreign sources for munitions in an emergency is separate and distinct from the current, peacetime practice of US defense manufacturers creating dependencies on foreign components. Yet, the fact remains that our defense industries increasingly have come to rely on foreign producers for many of their components.

### The Shortage Problem

Experiences from the Arab-Israeli war of 1973, as well as from American and NATO military exercises, indicate that the expenditure rates for munitions and other consumables in a probable large scale conflict would prove exorbitant. Trevor Dupuy's in-depth study of the 1973 war noted the high rates of consumption of ammunition and fuel.<sup>1</sup> The situation would worsen in the case of an outbreak of simultaneous hostilities in several parts of the world.

In July 1984, a congressional study reportedly concluded that Army units could not sustain combat against the Soviets, that the Navy would have difficulty sustaining full combat operations for more than a week, and the Air Force is not capable of conducting sustained conventional war operations against the Soviet Union.<sup>2</sup> Another study group concluded that, "Existing stockpiles of ammunition and peacetime production rates will be inadequate to support even low intensity combat operations for any extended period."<sup>3</sup>

Werner Groshans, of the US General Accounting Office, in 1983 likewise commented that, "Reviews of the industrial base element indicate that while industry can produce a lot of ammunition, it cannot meet total mobilization requirements."<sup>4</sup> Although this country has improved the situation since 1984, it still lacks the wherewithal for its military forces to endure. Other observers lament that our obsolete and unproductive industrial base cannot mobilize, or even meet near-term demands effectively. One reporter has asserted that the Pentagon's munitions stockpile today might not match what was fired in a month in Vietnam and it would require two years to develop a fully mobilized munitions industry.<sup>5</sup>

One might convincingly argue that in battle our military forces might be able to conserve "big ticket" items like tanks, combat aircraft, and large ships, but ammunition and expendable stocks could run dangerously low. Although the United States conceivably might buy items like helicopters or armored personnel carriers from foreign sellers, this discussion focuses on munitions because bullets, bombs,

artillery shells, mortar shells, and other such items very likely would become the "pacing items" of such hostilities.

The munitions industries in the United States focus on the production of ammunition of all sorts, missiles, rockets, conventional and guided munitions, small arms, and artillery. The industrial base on which they rely includes the chemical industry (propellants and explosives); the metal parts industry (component fabrication); the electronics industry (fuzing and guidance); and load, assembly, and packing facilities (end-item manufactures). For the most part, the US Government owns most munition-producing facilities. The munitions industry uses a variety of production technologies from traditional machine tools to evolving state-of-the-art robotics. Precision-guided and tactical missiles, incorporating high technology, represent new products for the industry. However, it should be emphasized that for the most part the munitions industry deals with lower and medium technology rather than with high technology. This fact has an important bearing on the future ability of the United States to tap foreign manufacturing sources.

Very few facilities in the United States have the in-depth surge and mobilization capacity to meet the probable needs of a larger conventional conflict. For the most part, US decisionmakers have not prepared the essential operational plans to achieve rapidly accelerated munitions production. European munitions industries do even less planning. In effect, the munitions industries in the United States and Europe generally have not taken surge requirements

seriously. American decisionmakers have inadequate plans or planning organizations; they allocate relatively little money to surge preparation; they virtually have no coordination with sub-tier contractors; they have not yet addressed potential manpower problems; and, they fail to pre-stock materials that might be needed if surge became a necessity. While citing these major deficiencies, one should note that, over the long haul, the United States has a domestic munitions base with a potent manufacturing capacity. Nonetheless, it still lacks the strength to meet wartime needs in the early days, weeks and, in some cases, months of a major military conflict.

Of course, battlefield commanders could reduce arbitrarily the expenditure rates of munitions, an act sometimes called intense battlefield management. Such an alternative offers a very dangerous course of action as it could lead to defeat, especially if the enemy has an uninterrupted flow of munitions, either from its own production or from a superpower sponsor. Consequently, someday the United States might find itself in a large enough war that it would have to tap the munitions inventories or production facilities of the newly industrializing countries to supplement the insufficient domestic production that we could expect in the early weeks and months of a conflict.

US policy calls on this country to maintain a strong surge and mobilization capability in its defense industrial base. Specifically, that policy states that the

DOD must not be put into the position of relying solely on foreign sources for development or production of critical end items or

component parts which are required under the DOD Industrial Preparedness Program to support surge and mobilization.<sup>6</sup>

Yet, Lieutenant Colonel O.M. Collins of the US Air Force, in 1984, feared that the Department of Defense may be forced to accept the reality of having to rely substantially on an international, or foreign, industrial base with all its corresponding political uncertainties.<sup>7</sup>

Foreign procurements, at best, can only supplement the increased production that we should expect from US domestic sources. Certainly, if in peacetime the United States were to build up domestically large enough munitions stockpiles, and to construct an on-going, rapidly expandable capacity of munitions production, then it would have little or no need to look elsewhere. Such an assured supply at home, under US control, offers the preferred solution to munitions supply demands. Yet, we realistically cannot expect the United States to spend the vast sums needed to build capabilities of such dimensions.

### The Desperate Search

Faced with a shortage of munitions in case of a relatively large-scale war, US defense leaders would seek munitions elsewhere that are compatible with weapons used by US military forces. US military commanders would look for arms especially suited for the terrain, climate, and other factors prevalent in the combat zone. Domestic munitions manufacturers might not be producing such specialized items, but producers in foreign countries might, and some

newly industrializing countries are building manufacturing facilities able to produce arms compatible with US specifications.<sup>8</sup>

The United States conceivably could look to Chartered Industries of Singapore, Australia's Department of Defence Support, *Dirreccion Generale de Fabricaciones Militares* of Argentina, Hsing Hua of Taiwan, or Poongsan Metal Corporation of South Korea to acquire certain types of compatible artillery ammunition. Likewise, Chartered Industries, Israel Military Industries, and Korean Explosives Co. Ltd. might prove able to provide needed landmines, as they now manufacture US landmine designs.

Mortar shells also should prove a greatly needed commodity. Chartered Industries, *Companhia de Explosivos Valparairba* and Engesa Quimica of Brazil, Payton Metal Corporation of the Philippines, Defense Support of Australia, *Dirreccion Generale* of Argentina, Hsing Hua, Indian Ordnance Factories, Israel Military Industries and Soltam of Israel, Korea Explosives Company, Nissan Motor Company of Japan and Poongsan Metal Corporation all manufacture mortar ammunition. Australia manufactures US pattern ammunition at its Maribyrong and St. Mary's factories.

Israel already is producing 120mm mortars and ammunition, hoping to export them to the United States and to Far Eastern countries. The Philippines manufactures US pattern equipment while Singapore builds to NATO standard calibers. Inasmuch as these countries gain advantages with large-scale production of mortar shells, local firms most likely

will continue to produce and export ammunition. Israel already has become a key supplier of mortar ammunition (especially the metal parts) to Western European nations.

The United States also might turn to its Western European allies for these military items. In some instances, Europe would prove responsive. In other circumstances, the United States could not count on its allies. First, Western Europeans themselves are short on a number of important munitions items. Second, our allies might have to join us in the conflict, channelling their munitions to support their own troops. Third, they might disapprove of US military actions and refuse to cooperate as they did during the airlift to Israel in 1973. Fourth, they might fear the spread of hostilities to Western Europe. Fifth, NATO allies might want to husband their ammunition for their own armed forces. In its planning the United States must prepare for a variety of contingencies, including looking beyond Europe for military supplies.

#### Beneficial By-products

The United States could reap advantages by procuring weapons from newly industrializing countries. If a conflict should erupt in the Persian Gulf area, by acquiring military supplies from Turkey, Israel, Australia, Singapore, (or, under some conceivable circumstances, from Egypt), we could save thousands of miles of shipment costs, thereby reducing the vulnerability of our lines. Likewise, if the conflict took place in Korea, procuring supplies in Japan, Taiwan, Singapore, Australia, or Malaysia could offer the same benefits. Even if this country

had to procure arms from Brazil or Argentina, it would succeed in diversifying its sources of supply and lines of communications, compounding the difficulties of enemy planners.

### Problems of Foreign Procurement

Although the newly industrializing countries offer the potential of supplying US forces in a combat situation with needed munitions, acquiring such supplies could impose serious problems. These include: the question of whether these countries produce sufficient quantities of appropriate munitions to warrant tapping them; the extent of their reserve production capacities; the issue of safety and quality control; the growing interdependence in munitions production; the question of exports; the terms of trade; and the temporary nature of US foreign munitions procurements.

Can the United States acquire sufficient quantities of needed munitions that would make its efforts to buy from these foreign sources worthwhile? Some investigators argue that in certain categories the United States has unused munitions capacity that it should try to augment before looking elsewhere. Most of the large caliber ammunitions base, it is claimed, is laid away in the United States or lies inactive in Western Europe.

Unfortunately, current and systematic production rate figures for munitions worldwide generally do not exist in the open literature. Thus, one has difficulty in assessing precisely what quantities of munitions the United States could expect from newly industrializing countries if US military forces entered combat. As an overall proposition, it is highly

unlikely that this country could tap the defense production of many foreign sources, but some would prove useful. Very likely, no one of these newly industrializing countries commands a high enough production capacity to provide the United States with the huge amounts of munitions that would meet its augmentation requirements or even fill any sizable gap that arose in a specific theater of combat. Nonetheless, the growth in munitions production worldwide during the past decades has proven significant. One could convincingly argue that, in the aggregate, such production could make a meaningful contribution to meeting US requirements.

Jacquelyn Porth argues that Argentina's production of artillery and certain types of ammunition is fairly extensive.<sup>9</sup> Argentina's military, according to Porth, has a vast array of military equipment at its disposal (obviously not all domestically produced). Similarly, Robert Harkavy and Stephanie Neuman report that the majority of Israel's military exports are in the category of small arms and ammunition, plus missiles and electronics.<sup>10</sup> There seems no insurmountable bar to US troops using Argentine or Israeli arms, including the highly successful Israeli Gabriel missile. Young-Sun Hai notes, also, that various types of bombs and mines, in addition to other military items, went into mass production in South Korea in the latter half of 1977.<sup>11</sup> With such production for over a decade, some significant inventories have emerged in that country. Brazil also sells large amounts of artillery and artillery shells, especially in the Middle East.

In 1986 non-European, non-United States, and non-Warsaw Pact nations reportedly could produce

more than 1,115,000 rounds of artillery ammunition, with increasing production expanded to 1,480,000 rounds by 1995. It also is estimated that these countries could manufacture 2.5 million units of mortar ammunition and 5.6 million in munition fuzes in 1986, increasing to 3.9 million and 5.8 million units, respectively, by 1995. The anticipated production of landmines in these countries in 1986 probably totaled about 450,000, which would be about seven times greater than landmine production in the United States.

It also was estimated that in 1986 these countries manufactured 320,000 units of tank gun ammunition and 5.8 million grenades. Critics most likely would challenge the accuracy of these estimates; nonetheless, even these estimates provide enough evidence to suggest that munitions production in these countries could prove significant in case of an emergency.

These newly industrializing countries have little in the way of reserve production capacity. Like the Europeans, they confront limitations in munitions production chiefly because of economic reasons. For example, Western European munitions manufacturers operate on a commercial basis, as do advancing Third World nations. Their production complexes often need high capitalization devoted to building facilities like chemical plants and forging operations. Consequently, their managers tend to use these facilities to the fullest extent possible, sometimes for producing civilian items. As a result, they lack the reserve capacity to meet wartime needs. In addition, labor laws and regulations sometimes inhibit fullest use of these facilities.

Newly developing countries often provide little incentive to build a reserve capacity, and their governments do not provide the funds to ensure such augmentation. In these cases, the United States might be able to tap their existing production capacity, but cannot count on these countries for surge purposes. Nonetheless, acquiring these items from their inventories, as well as from their existing production capacities, could prove beneficial to the United States. Historical precedents exist for such actions. To prevent Israel from suffering a defeat in the Arab-Israeli War of 1973, when the Israelis began to run out of military supplies, the United States withdrew huge amounts of military material from its own forces in Western Europe for shipment to Israel. At the time, the threat to Israel seemed more critical to US national security interests than the possibility of a Soviet attack against US forces in Central Europe. In the future, some newly industrializing nations might similarly assess risks and provide the United States with war materials even if it meant reducing the readiness of their own forces temporarily.

Issues of safety and quality control could raise critical questions for US defense leaders. Foreign defense industrial enterprises do not always exercise sufficient production control. As a result, munitions sometimes are ineffective and do not perform properly. For example, although Argentine pilots hit British warships with iron bombs during the Falklands War, these bombs failed to explode. US procurement officials must make sure that they do not buy defective munitions. Furthermore, by their very nature, munitions represent potentially dangerous items whose manufacture, handling, storage, and shipment require great care. Foreign nations sometimes

do not give sufficient attention to safety factors in designing, manufacturing, storing, packing, moving, and loading into weapons these potentially perilous items. At all costs, military commanders want to prevent these munitions from prematurely exploding, killing, or maiming American troops assigned to handle or to fire them. Thus, the question of adequate safety might pose a barrier to procuring munitions abroad even in the midst of a war. Can the United States insist that foreigners adhere to the high munitions safety standards demanded by US defense managers?

Growing interdependence in munitions production also could compound the problem. Sometimes the munitions production of newly industrializing countries depends on a United States producer, or on another nation for one key item. For example, Korea and Malaysia rely on the United Kingdom for combustible cartridges for some artillery and bomb propelling charges. The United Kingdom, under conflict circumstances, could not meet limited expansion for its own needs, let alone supply other nations of the world. The munitions supply chain is highly interdependent, especially in the area of large-caliber ammunition and new ammunition designs. Newly industrializing nations fashion their munitions base to supply their own forces and may not prove capable of meeting expanded US needs in a hurry. This problem exists particularly in the cases of metal parts, explosives, and propellants. The interdependence problem does limit what the United States can expect to gain from foreign procurement, but probably does not preclude acquiring modest amounts of certain wartime munitions from Third World countries.

Can US leaders expect these newly industrializing countries to export munitions to the military forces of the United States? By and large, the size of their production capacity to date has rested on their ability to sell to others. New producers, already in the export business, no doubt would welcome a chance to sell more munitions to the United States, probably to the limit of their export capacities. If the economic advantages were high enough, they probably would reduce deliveries to their own armed forces to gain the profits from such sales if they confronted no immediate or direct local threat against themselves. In such a case, the limiting factor becomes the existing and surge capacities of their manufacturing facilities. Such sales would earn the hard currency that these countries urgently need.

In the history of arms sales, Third World nations generally have not allowed ideology to become an important impediment to business transactions. During Iran's war with Iraq, even Israelis sold Iran certain military equipment, despite the strident enmity of Iran's clerical leaders toward the Jewish state. It would seem that the chance to acquire hard currency outweighs any ideological reluctance that these countries possibly entertain. Furthermore, most of these new producers are friendly toward the United States, some with alliance relationships.

For its part, the United States must recognize that it would be importing mostly munitions of middle-or low-technology. Furthermore, this country could accelerate manufacturing its own low-technology munitions, thus reducing, but certainly not eliminating, the need for low- and middle-technology imports. We might assist these countries by

transmitting technology associated with less advanced munition designs, thereby strengthening the US position in the world trade market for more advanced munitions

It is important to note that the United States would buy munitions abroad chiefly as an interim measure. Should any conflict last beyond a year or so, US domestic production should prove more than able to meet wartime needs. By augmenting current production lines and by converting civilian plants to arms manufacturing, this country's productive capacity could grow awesomely. No doubt, as previously stated, we would begin to reintroduce high technology munitions. Yet, to reach such high production rates demands time, more time than our troops in the field could afford. The interim period could prove critical. With a flow of foreign munitions, US fighting forces could very well avoid defeat and escape the dire consequences that would follow a military catastrophe caused by inadequate munitions.

### US Options

Can the United States do anything, especially beforehand, to increase the chances of successfully acquiring munitions in newly industrializing countries during a wartime emergency? Although there are major limitations to such a course of action, if necessary, this nation could take steps now to arm its military forces in the early stages of hostilities through foreign procurement.

First, the more the United States helps these countries build manufacturing bases that produce

munitions compatible with American arms, the better off it would be in a war emergency. To gain such compatibility, the United States should try to influence newly industrializing countries to build munitions production capabilities along American lines. Of course, critics would point out that by such actions the United States simultaneously would be assisting future competitors in the international munitions trade. However, it appears doubtful that US managers, engineers, or businessmen would sell these potential competitors knowledge about high-technology munitions. The new producers still would be concentrating on manufacturing low- and middle-technology munitions.

US publicly owned facilities, as well as the nation's small private munitions manufacturing sector, could perform a valuable service by entering into joint ventures with friendly Third World countries. The United States would benefit not only from increased international trade, but from possible access in case of industrial surge or mobilization. Otherwise, although munitions production has increased worldwide in recent years, future growth may slow.

Second, our defense and intelligence officials already have the responsibility of cataloguing potential foreign defense manufacturing sources. US decisionmakers should have a complete and accurate data base, telling them where to look for specific kinds of armaments. These data should indicate production rates, surge capacity, and safety and quality traits. During a conflict the United States can ill afford to start from scratch searching for foreign sources producing specific types of munitions.

US leaders should know immediately who produces what. Today, such information lies scattered among both public and private sources. This country would do well to consolidate and systemize this data into a single, authoritative source for quick and easy access. Computerizing this information would assist in identifying the choke points and how they affect efforts toward augmenting munitions production, especially regarding metal parts, propellants, special chemicals, and explosives such as ROX. Gathering this information will prove no easy task. Many governments hide such information even from their own people, and sometimes they withhold it from their own defense industries. Nonetheless, the United States should make a determined effort to collect this information.

Third, the United States might conclude Memoranda of Understanding (MOU) with friendly countries, setting out the terms of trade for tapping the defense production of other nations in case of an emergency. Perhaps this country might begin negotiating such agreements with nations that have significant arms production, but which confront no meaningful or immediate threat to their borders or survival, like Brazil and Australia. Further, the US government should see to it that we do not enter into contracts that would impair the ability of US defense industries to furnish supplies or services in case of an emergency.

The MOUs would set down the conditions of potential international transactions much as the Machine Tool Trigger Orders do for the US Government and the domestic machine tool industry; and, they might lay out safety requirements. Some obstacles

stand in the way of wholesale signing of such MOUs. Most likely, domestic US defense industries would oppose such international agreements, arguing that they would export jobs. Foreign producers might complain that the terms of trade are insufficiently attractive. Perhaps, if US and foreign facilities began engaging in such joint ventures on an industry-to-industry basis the opposition might abate. People find ways of accommodating to each others' reservations.

Fourth, the demands of actual battle change attitudes toward and requirements associated with foreign procurement. In the absence of war, we tend to view matters through a peacetime prism and tend to seek as near perfect an arrangement as possible. Thus, factors like limiting ourselves solely to domestic munitions production, the highest safety standards, attractive terms of trade, and conserving foreign exchange take on great importance. When troops begin fighting and dying, a new psychology prevails. Things that appeared unwelcome or impractical become desirable and feasible. As we find our domestic supply of munitions insufficient in the interim stages of a war, our fighting forces will find ways of using foreign procured munitions with telling effect.

### Summary

To summarize, then: if the United States someday finds itself fighting a sizable, conventional, military conflict, it probably will try to procure needed munitions and other military items from newly industrializing nations. Expected rates of munitions

expenditures, plus the inability of this country's domestic production to meet all of its early needs, would prompt the United States to tap the production sources of other nations. One could anticipate that the production capability of these Third World nations could not fill the gaps that appear in US war-time supplies or meet the nation's total arms requirements; however, US military commanders could look for help and success at the margins at a critical juncture in combat.

Although the United States probably would gain from signing MOUs beforehand, assuring such access, military leaders really cannot count on such a development. Nonetheless, the United States should encourage joint ventures by public and private American munitions manufacturers with their counterparts in friendly, newly industrializing countries. Our government also should perform beforehand the information gathering, thinking, and planning that would increase the chances of acquiring interoperable or specialized military items when our fighting forces need them. Above all, in case the United States should someday find itself in a fairly large armed conflict, foreign procurements could provide this nation with a diversification in sources of arms, and especially munitions, that would prove of great value.

## 9. US POLICY OPTIONS

The emergence of newly industrializing countries, especially those capable of manufacturing their own arms, affects US national security both positively and negatively. As indicated at the outset, this study accepts the premise that such weapons production probably will not alter the global balance of power in any major way. However, it has offered concepts and examples that demonstrate the *regional* political influence that accompanies the production and export of arms and how, at times, an arms business can affect conditions even beyond the immediate geographical area.

### The Policy Extremes

Those opposing the export of military products from the United States would resist even more strongly the transfer of manufacturing technology to produce arms. At least with the sale of completed weapons, importing countries might remain susceptible to pressures by advanced industrial exporters. The latter might cut off the flow of spare parts or repair services if the importing country initiated military adventures of which the supplier disapproved.

Thus, the ability of some nations to make war or peace decisions is dependent on the spread of defense-production knowledge. Therefore, since importing nations still must rely on the more industrialized states for advanced designs and technology, outside influences do not disappear as these recipients gain productive capacity. There is an implied assumption that the major powers and arms suppliers behave more cautiously and responsibly than their customers.

Proponents of a complete US ban on assisting newly industrializing countries to build up indigenous arms industries have as their objective preventing arms races. Such competition, they argue, creates instabilities that, in turn, spawn armed conflict. Yet, other advanced industrialized nations seem willing, even eager, to sell the military items when the United States bans them. France, Great Britain, and other advanced industrial countries have not hesitated to sell finished weapons when the United States cut off arms exports.

A US policy of consciously trying to halt the growth of defense industries by banning US involvement in the arms production trade is bound to fail. Strict limitations on arms sales received strong policy support from President Carter who lamented the "spiralling arms traffic." On 19 May 1977, Carter announced:

the United States will henceforth view arms transfers as an exceptional foreign policy implement, to be used only in instances where it can be clearly demonstrated that the transfer contributes to our national security interests.<sup>1</sup>

He also imposed a "dollar ceiling" on the export of advanced weapons to regions of the world in which these weapons had not already been introduced. The history of Carter's failure to implement this policy and to enforce these ceilings is well known. Both foreign and domestic pressures (especially from Congress) led to the end of the arms embargo to Turkey, the sale of AWACs to Iran, and the sale of some 200 advanced-fighter aircraft to Middle Eastern countries. The gap between the announced policy and the realities of the situation were apparent. The waivers and exceptions that were part of the original policy were granted so often that they destroyed the credibility of the announced policy itself.<sup>2</sup>

Buyers now have even more sources from which to acquire weapons and military manufacturing know-how. Countries like Sweden and Switzerland already are willing, if not anxious, to sell arms. The newly industrializing countries simply add to the list of arms exporters. The Soviet Union and arms producing Warsaw Pact countries no doubt would be delighted if the United States left arms exporting open for communist penetration.

For a policy of export denial to succeed, all actual, and perhaps potential, arms exporters would have to agree on a nonproliferation agreement against the spread of conventional arms production. One might argue that since the nuclear nonproliferation treaty took effect, only a handful of countries have detonated nuclear explosions, among them India and the PRC. However, we have no proof that the nonproliferation treaty, rather than limitations in funds and knowledge, brought about this result.

Moreover, conventional weapons simply do not arouse the heightened emotional response that nuclear weapons do. The world has lived with conventional arms for so long that many people accept them as a natural phenomenon. In addition, the economic benefits of weapons production in the form of jobs and the acquisition of new technology, prove very attractive to the leaders of these countries. It is unlikely that the nations of the world under any arms control arrangement would agree to banish the export of defense manufacturing know-how. As a result, the United States must chart its future with the spread of conventional arms industries as a given factor in international relations.

Conversely, any suggestion that the United States government should impose *no limits* on the sale of American arms manufacturing know-how to other nations likewise makes little sense. Some US defense industrial spokesmen would like to see all international arms transactions concluded on a company-to-company basis, unfettered by governmental intervention. To these individuals, such sales are simply business deals, and should be subjected only to market forces. They argue that the US government should stay clear of the foreign arms business and should intercede only to help American firms sell arms abroad. Yet, despite such exhortations, exporting armaments and arms manufacturing knowledge to other countries is not the same as selling Coca Cola or wheat. Arms relate directly to US national security. Therefore, the government has no alternative but to intercede and set the general rules and regulations that govern the export of weapons and arms-production knowledge.

Both extremes of policy would prove difficult, impossible to implement and, most likely, would not aid this country in achieving its objectives either globally or in specific regions.

Without a doubt, US decisionmakers must examine issues such as: how this country could best help Israel since the Israeli cabinet decision to scrap the Lavi aircraft; the growing competition to US defense industries of newly industrializing countries in the world's arms market; the possible leakage of US technology to unauthorized destinations; the degree to which the United States could and should use security assistance (Foreign Military Sales credits) to help newly industrializing countries build their defense industrial bases; the development of foreign weapons designs; and the possible procurement of munitions by the United States from newly industrializing countries in the event of a US mobilization emergency.

### Current US Policy

In 1986 the then US Undersecretary of State, William Schneider, summed up US concerns, indicating that technical models, designs, and drawings, given to countries like South Korea and Pakistan at minimal cost, for the expressed purpose of maintaining and operating US weapons, have been used to increase the flow of production knowledge to unauthorized destinations.<sup>3</sup> We already have noted that former Secretary of Defense Weinberger favored exporting weapons and arms manufacturing know-how to other countries, but still wanted to control the technologies so that critical information

would not leak to the Soviets.<sup>4</sup> Such a policy seldom remains effective for long.

One cannot lay out beforehand concrete courses of action that will prove suitable under all circumstances. What the United States might do for South Korea, should the threat from the north increase greatly, no doubt differs from the steps that this country might take if Paraguay or Chile should request arms or arms-production knowledge. In short, because the options vary, US leaders must make decisions on a case-by-case basis under the umbrella of US security interests. This conclusion undoubtedly sounds like a platitude but is nonetheless valid. What criteria might US decisionmakers use in making up their minds?

#### Criteria for Decisionmaking

- The export of arms production knowledge should promote stability rather than instability in the region of the recipient. Here it is necessary only to reiterate that US leaders seek stability as a means of avoiding war. Yet, in the minds of many people, any transfer of weapons or manufacturing knowledge, just like the export of finished arms, inevitably leads to war. On the other hand, all US administrations since World War II believed that by providing arms to friendly countries, they strengthened local deterrence.
- Should local deterrence fail, US assistance should help allies and friends defeat any aggressive military action taken against them. US military aid to states like Egypt, Israel, and South Korea is designed to help them blunt

any attack by hostile military forces. US security assistance came into being to serve this very purpose. By providing arms production knowledge, in addition to finished weapons, the United States should enhance the ability of such countries to ensure their survival and maintain their integrity. Sometimes we find both belligerents using American weapons—as in the fighting between Israel and Jordan—creating a delicate, and sometimes an embarrassing, situation for the United States. However, for the most part, our allies and friends face communist and, very often, Soviet weapons. Thus, if US aid in transferring arms manufacturing know-how helps create a military imbalance in any region, the United States prefers this imbalance to favor its allies and friends.

- The recipient's record in supporting US policies and the opportunity to shift a country's attitude from hostility to sympathy toward the United States are important political considerations. For example, US leaders most likely would honor a request from South Korea or Israel sooner than from the many Third World countries who often distance themselves from the United States, or frequently criticize its policies. It is natural that the United States would treat its constant supporters more favorably. On the other hand, exporting arms manufacturing capabilities might help wean a recipient from its sympathies toward the communist world or, specifically, toward the Soviet Union. Such is the case with India. Sales

of weapons production knowledge might very well enable India to reduce its almost total dependence on the Soviet Union for big military items, such as jet fighter aircraft. One would expect the United States to prefer to see India manufacturing F-5 or F-16 aircraft than MiG-21 or MiG-23 fighters.

- The United States must have confidence that any direct or dual use defense manufacturing technology that it furnishes a recipient will not leak to unauthorized destinations, especially to the Soviet Union.<sup>5</sup> Those countries that have a more effective means for safeguarding technical information most likely would receive a more sympathetic hearing to a request for arms production know-how. The Reagan administration strongly urged the industrializing countries of East Asia to apply stricter controls on advanced technology imports from the United States. US officials reportedly asked Singapore, which has built a considerable export trade in high technology items imported from the United States, to reexamine its rules, regulations, and their enforcement. For their part, Singapore's officials, like officials in any developing country, have become peeved at what they consider as an unwarranted US intrusion in their business.<sup>6</sup> Nonetheless, US officials, fearing inadequate controls in developing countries plagued with swollen, inefficient bureaucracies feel it is necessary to bring this matter to the attention of states importing weapons manufacturing knowledge.

- Those countries able to provide the United States with a technological payback probably should receive greater consideration. Israel has a long history of returning to its major arms supplier technical improvements that it has made on imported weapons or the lessons learned in actual combat. First, the French and later the United States, were beneficiaries of Israeli technological ingenuity. Perhaps other newly industrializing countries someday might join in improving the performance of US-designed weapons and passing this information on to the United States. South Korea, Singapore, and Brazil are fast approaching the time when they can add new wrinkles to their American equipment, including military electronics. However, one should avoid the conclusion that these countries always will forward to the United States dramatically improved components. The fact remains that several newly industrializing nations are gathering the intellectual talent and skills that might enable them to return to the United States some technological dividends from the development and production investments that the United States has made in these countries.
- The existence of competent foreign competitors should influence US decisions about furnishing arms manufacturing know-how to other countries. This criterion is merely an extension of the "foreign availabilities" argument that often colors the debate over US arms exports. The chances of concluding a nonproliferation treaty prohibiting the exports of

arms production knowledge are very slim and the United States most likely will continue to contend with foreign competitors.

- The export of arms manufacturing knowledge can have different impacts during peace and wartime. In peacetime, the United States generally has access to foreign sources. Because these foreign manufacturers often enjoy lower labor costs, their products often cost less than their American counterparts. Thus, in peacetime, US military services tend to buy a significant amount of their components abroad. If war erupts, however, we cannot count on uninterrupted access to any foreign producer. In the current peacetime situation, the argument about US "dependencies" on others for military arms and components already grips the attention of defense managers. By assisting additional countries to build arms manufacturing capabilities, we might conceivably increase that dependency. Is there an irreducible minimum beyond which the United States should not allow its domestic defense production base to fall? If so, how will a proliferation of weapons production affect this minimum? Because the United States has not yet provided weapons production knowledge to a large number of Third World countries, the problem has not yet reached worrisome proportions. For the most part we depend on countries like Japan, Korea, Israel, and Western European allies, most of whom have built defense industries with their own resources. In the future, we simply will have

to examine closely if US arms manufacturing assistance will further aggravate the dependency problem.

- Closely related to the previous criterion, the US export of weapons manufacturing knowledge should establish or enlarge foreign sources of munitions which the United States could tap if the need for industrial mobilization arises. This criterion does not represent a preferred solution for acquiring armaments, but rather a realistic option this country might have to pursue if it were forced to fight a Korea-sized or larger war.
- We have to be sure that the recipient nation has the capacity to absorb the arms production knowledge that the United States exports. It makes little sense to sell a foreign country a manufacturing facility that it cannot manage or operate because it lacks skills, talent, or other resources. All the newly industrializing countries probably possess a large enough pool of skilled people and domestic capital to have a decent chance to make some enterprises successful. This problem will prove most difficult for nations not yet "newly industrializing." Many Third World nations, including the newly industrializing countries, desperately want to gain high technology from the United States. The United States must decide whether a nation requesting arms manufacturing know-how is going beyond its technological depth. Other types of military technology might prove more suitable. As we have seen, Engesa in Brazil,

showed that it could produce fine middle-technology weapons both for equipping the Brazilian armed forces and for export.

- The United States might utilize a foreign weapons producer to export arms manufacturing knowledge when this country, for domestic or foreign reasons, should not or cannot take such actions.<sup>7</sup> In these cases, a friendly arms manufacturer such as Israel or Korea might sell weapons manufacturing know-how the country in question.<sup>8</sup> In its future relations with Taiwan, the United States might very well find the need for such arrangements. This country has promised the PRC that it would cease being a major arms supplier to Taiwan. If one day the United States, in its national interest, concludes that Taiwan does require certain additional arms, it could encourage a friendly arms producer in the newly industrializing world to sell weapons to Taiwan.
- The United States must choose the proper technology export mechanism that best suits the industrial capacities of foreign countries and the US government and its defense contractor's preferred industrial arrangements. When a foreign buyer has considerable industrial and technological strength and insists on major offsets, the coproduction or licensing routes might appear the most logical. Both these arrangements enable the buyer to keep its technical talent usefully occupied and to gain profits from third party sales. When the

importer lacks an indigenous industrial capability, other types of offsets, including selling turnkey plants, offering limited production of middle-or low-technology components, and establishing education and training programs designed to upgrade the technological competence of the importer's personnel, seem more reasonable.

### Multilateral Actions

The United States cannot achieve its foreign policy objectives relative to foreign arms production solely by unilateral action. For example, this country follows a policy of discouraging the proliferation of regional medium-range ballistic missiles, especially those armed with nuclear or chemical warheads, throughout the Third World. The Iraqis hurled chemical missiles against both the Iranians and rebel Kurdish tribesmen with disastrous effects. Iraq imported these missiles, but Israel, North Korea, South Korea, Argentina, Brazil, and possibly Iraq now or in the future might be able to manufacture missiles with extensive range and power. The Israelis used either the Jericho II or a more advanced Comet missile to launch successfully a satellite into orbit, a considerable technological feat for a small country.<sup>9</sup> These missiles could hit distant Arab lands such as Libya and have prompted a warning from Moscow.

In September 1988 the United States met with its industrial allies—Great Britain, France, West Germany, Italy, Canada, and Japan—to block Argentina's reported development of its medium range Condor II missile.<sup>10</sup> In its effort Argentina reportedly

is receiving technical assistance from Egypt and financial backing from Iraq. Since 1983 the United States had tried to negotiate an agreement among these 7 powers to control exports of missiles and missile technology. In 1987 these 7 nations signed an accord creating a "Missile Technology Control Regime" that provided the institutional framework for the 1988 attempt by US leaders to coordinate actions to curb the spread of missile technology.

### The Last Word

The rise of newly industrializing nations, capable of manufacturing and exporting arms, has affected in meaningful ways the distribution of power in various regions of the world. The United States must chart its course in an environment shaped by additional weapons manufacturing centers. Therefore, US decisionmakers must take this transformation into account when fashioning foreign policies and actions. This development presents the nation with both opportunities and problems. However, any progress in policy formulation depends on recognizing the new defense industrial features on the international landscape.

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## INDEX

- Aero Industry Development Center (AIDC) (Taiwan), 91, 92
- Alfonsin, Raul, 113
- Angola, 68
- Arab-Israeli war (1973), 51, 61, 136, 146
- Arens, Moshe, 53
- Argentina, 23-30
  - aerospace industry in, 27-29, 167
  - arms exports by, 29-30
  - arms imports by, 3, 4, 25, 64, 65
  - defense industries in, 17-18, 25-29, 128
  - foreign technical assistance to, 26, 27, 28, 128
  - historical background of, 23-25
  - motivations of, for arms production, 12-13, 14, 17, 23
  - nuclear developments in, 113
  - potential supplier of munitions to US, 141, 144
  - regional power balance and, 113, 115
- Armament Development Authority (Israel), 56. *See also* Rafael
- Armaments Development and Production Corporation (Arm Scor), 71, 72, 74
- Arms production/sales (global), 4, 5, 8-11, 97-100. *See also* Newly industrializing countries
- ASEAN countries, 6, 115
- Atlas Aircraft Corporation, 73
- Australia, 6, 18, 37, 141, 151
- Bedek, 53-54
- Belgium, 4, 55
- Bolivia, 29, 39
- Brazil, 30-40
  - aerospace industry in, 27, 33-34, 101
  - and Argentina, 24, 25, 27, 29
  - arms exports from, 7-8, 9-10, 35, 38-40, 131
  - arms imports by, 37

- defense industries in, 18, 19, 31–38, 101, 129, 131
- foreign technical assistance to, 18, 33, 34, 37, 38, 129
- historical background of, 30–31
- motivations of, for arms production, 12, 13, 14, 17
- nuclear developments in, 113
- potential supplier of munitions to US, 141, 144, 151
- regional role of, 111–112, 113, 115
- technology level in, 18, 19, 37, 38, 101, 105, 106, 163
- United States and, 31–33
- Britain, 4, 9, 39
- arms exports to India from, 43, 45, 49
- arms exports to Latin America from, 3, 4, 37
- Carter, Jame E., 14, 31, 156–157
- Chile, 29, 39
- China, 6
  - arms imports by, 39, 40, 62, 102
  - and India, 115–116
  - and Taiwan, 91
- China Shipbuilding, 93
- Chun (President), 80, 86
- CITEFA (Instituto de Investigaciones Cientificos y Sienicas de los Fuerzos Armados), 28–29
- Collins, O. M., 140
- Colombia, 39, 64, 65
- Czechoslovakia, 4
- Direccion Generale de Fabricantes Militar (FM), 26
- Dupuy, Trevor, 136
- Ecuador, 64, 65
- Egypt, 6, 116–117, 126, 131, 167
- El Salvador, 29
- Elbit Computers, Inc., 56–57, 58
- Elron Electronics Industries, Ltd., 57
- Embraer, 33, 39
- Engenheiros Especializados SA (Engesa) 35, 36, 39, 102, 105, 165
- Ethiopia, 50
- Fabrica Militia de Aviones (FMA), (FMA), 26, 27, 28
- Fabrique Nationale (FM), 55
- Falkland Islands war, 3, 146

- France
  - and Brazilian arms industry, 33, 37
  - arms embargo against Israel by, 13, 51
  - arms exports by, 4, 9, 37, 43, 45, 69, 108
  - arms imports by, 39
  - and Indian arms industry, 46, 47
  - and South African arms industry, 72, 73
  - technology transfer role of, 99
- General Dynamics, 84
- General Electric, 128
- Groshans, Werner, 137
- Guyana, 39
- HAL, 46, 47, 50
- Harkavy, Robert, 144
- Honduras, 29, 64, 65, 112
- Hughes Aircraft, 84, 85
- IMBEL, 36
- India, 41-50
  - arms exports by, 49-50
  - arms imports by, 42, 43-45, 47
  - and China, 41, 44, 115-116
  - defense industries in, 18, 43, 45-49, 104-105, 117-118, 128
  - defense policies of, 41-45
  - motivations of, for arms production, 12, 15, 47-48, 49
  - nuclear capabilities of, 42
  - and Pakistan, 41, 42, 43
  - potential supplier of munitions to US, 141
  - regional role of, 110-111, 115-116
  - Soviet Union and, 44-45, 46, 47, 48-49, 50, 116, 117-118, 128
  - and US, 43-44, 45, 102-103, 121-122, 141, 161-162
- Indonesia, 87
- Iran, 121
- Iran-Iraq war, 35, 110, 167
- Iraq, 35, 39, 110, 167
- Ironi, Yitzhak, 51
- Israel, 4, 50-65
  - aerospace industry in, 52-54, 58-60, 100, 101, 167
  - arms exports from, 9-10, 62-65
  - arms imports by, 18, 58, 126, 128, 146
  - arms sales in Latin America by, 3-4, 25, 112
  - arms sales to China by, 62, 102
  - arms sales to Iran by, 148
  - arms sales to South Africa by, 62, 69, 74, 129

- arms sales to US by, 57–58, 64, 103, 130, 131
- defense industries in, 19, 52–61, 103–104, 128–129, 130
- high technology of, 56–60, 100, 101, 167
- historical background of, 51–52
- Middle East power balance and, 112–113
- motivations of, for arms production, 12, 13–14, 17
- potential supplier of munitions to US, 141, 144
- research and development effort of, 51, 54
- technological payback from, 162–163
- US assistance to, 58, 59–60, 126, 128, 146
- Israel Shipyards Ltd., 55, 61
- Israeli Aircraft Industries (IAI), 52–55, 58, 59, 60, 62, 63–64
- Israeli Military Industries (IMI), 55, 60, 61
- Italy, 69, 84
- Japan, 34, 141
- Kim-II-Sung, 79
- Klare, Michael T., 6–7, 127
- Korea Defense Industries Association (KDIA), 86
- Latin America, 113, 115. *See also* Argentina; Brazil; Chile; Colombia; Ecuador; Guyana; Nicaragua; Paraguay; Peru; Uruguay
- Libya, 7–8, 98
- McDonnell Douglas, 127–128
- Middle East. *See also* Egypt; Iraq; Israel; Libya; Saudi Arabia; Syria; Qatar
  - arms imports into, 13, 51, 97–98, 99, 108, 146
  - 1973 war in, 51, 61, 136, 146
  - power balance in, 112–113, 116
- Missile Technology Control Regime, 167–168
- Morocco, 75
- Mozambique, 50, 68
- Namibia, 67–68
- NATO, 142
- Netherlands, 34
- Neuman, Stephanie, G., 98, 144
- Newly industrializing countries, 4–5. *See also*

- Argentina; Brazil; India; Israel; South Africa; South Korea; Taiwan
- arms production and sales by, 5-10
- international economic conditions and, 97-100
- licensing and coproduction in, 129-131, 166
- motivations for arms production in, 11-17, 20-21
- nuclear capabilities of, 42, 69-70, 113
- potential suppliers of munitions to US, 133, 135-136, 139-141, 144-153
- purchase of arms from one another by, 98-99
- regional stability and arms sales by, 7-8, 108-109, 110-116
- seek offsets, 125, 127-128, 166-167
- technological capabilities of, 17-20, 100-106
- upgrading of existing weapons by, 103-105
- Nicaragua, 20
- Nixon Doctrine, 15
- North Korea, 79, 82
- Northrop, 109
- Nuclear weapons, 42, 69-70, 113
- Offsets, 125, 127-128, 166-167
- Pakistan, 12, 20, 41, 42, 43
- Papua New Guinea, 64, 65
- Paraguay, 29, 39, 111-112
- Peron, Isabel, 24
- Peron, Juan, 24
- Peru, 29
- Philippines, 141
- Pierre, Andrew, 6, 7
- Porth, Jacquelyn, 144
- Qadhafi, 98
- Qatar, 39
- Rafael, 56, 58
- Reagan, Ronald, 32, 108
- Reagan administration, 162
- Regional stability, 7-8, 108-109, 110-116
- Rockwell International, 128, 129
- Romania, 131
- Sadat, Anwar, 116
- Sandock Austral Pty, Limited, 72
- Sarney, José, 113
- Saudi Arabia, 91-92, 100-101, 131
- Schatzki, Erich, 53
- Schneider, William, 159

- Schwimmer, Albert, 53  
 Security assistance program, US, 124-131  
 Shamir, Yitzhak, 17  
 Shuey, Robert, 6-7  
 Shultz, George, 107  
 Silva, Osires, 33  
 Singapore, 6, 105, 162, 163  
 Soltam Corporation, 61  
 South Africa, 3, 4, 67-75  
   arms exports by, 74-75  
   arms imports by, 18, 62, 128, 129  
   defense industry in, 70-74, 128, 129  
   motivations of, for arms production, 12, 14, 16, 20  
   nuclear capability of, 69-70  
   political situation of, 67-69  
   regional role of, 111  
 South Korea, 4, 77-88  
   arms exports by, 85-88, 131  
   arms imports by, 18, 78-79  
   coproduction and licensing in, 84-85, 128, 130, 131  
   defense industries in, 18, 80-85, 128, 130, 131  
   economic development in, 77-79  
   high technology capabilities of, 80, 105, 163  
   imports US technology, 81, 84, 85, 87-88, 128, 130  
   military situation of, 79  
   motivations of, for arms production, 12, 14-15  
   potential supplier of munitions to US, 141, 144  
   regional stability and, 115  
   relations between United States and, 78-79, 87-88  
   research and development in, 80, 81, 82, 83-84  
 Soviet Union, 4, 7, 50  
   acquisition of US technology by, 118, 121, 122-123  
   arms and production assistance to India from, 44-45, 46, 47, 48-49, 116, 117-118, 128  
 Specialized Engineers Inc., 101  
 Strategic Defense Initiative, 100, 101  
 Sweden, 4, 9  
 Switzerland, 4  
 Syria, 100-101  
 Tahiliani, R. H., 49  
 Taiwan, 4, 88-95  
   arms exports of, 94-95, 131

- arms imports by, 90, 91, 126-127, 166
- defense industries in, 18, 89-94, 128-129, 130, 131
- high technology capabilities in, 92, 93-94
- licensing and coproduction arrangements of, 128-129, 130, 131
- motivations of, for arms production, 12, 13, 15
- potential supplier of munitions to US, 141
- Technological payback, 163
- Technology transfer, 40, 99, 118-124, 128-131
- issues facing IJS, 45, 102-103, 120-124, 155-168
- licensing and coproduction in, 128-131, 166
- of Soviet technology to India, 44-45, 46, 47, 48-49, 116, 117-118, 128
- of US technology to Soviet Union, 118, 121, 122-123
- Third World. *See* Newly industrializing countries
- Thyssen Henschel, 128
- Thyssen Nordseewerke of, 26, 27
- United Arab Republic. *See* Egypt
- United States
  - and Argentina, 4, 24
  - and Brazil, 31-33
  - arms export and technology transfer criteria for, 160-168
  - arms imports by, 11, 39, 57-58, 64, 103, 130, 131, 164
  - arms sales as political instrument of, 4, 12, 13, 14, 15, 20
  - effect of foreign arms production on, 6, 87-88, 109, 112, 114-115
  - export denial policy of, 155-158
  - global arms market and, 4, 8, 9
  - global objectives of, 107, 110, 114
  - India and, 12, 43-44, 45, 102-103, 121-122, 141, 161-162
  - military assistance to Israel from, 58, 59-60, 126, 128, 146
  - munition supply problems of, 133-140, 143, 148-149
  - Pakistan and, 20
  - potential foreign procurement of munitions by, 133, 135-136, 139-153, 165
  - security assistance program of, 116, 124-131, 160-161

- South Korea, relations  
with, 77, 78-79, 87-88,  
115
- South Korean defense  
industry and, 81, 84,  
85, 87-88, 128, 130
- Taiwan and, 88, 90, 91,  
94, 126-127, 166
- technology transfer is-  
sues and, 102-103,  
120-124, 155-168
- and Third World, 107-  
108
- Uruguay, 29
- Vaidya, A. S., 48
- Venturi, Danilo, 32
- Weinberger, Caspar, 122,  
159
- West Germany, 9  
and Argentina, 26, 27,  
28, 128  
and Brazil, 37, 129  
and India, 45, 46, 47, 49
- Whitaker Ribiero, José  
Luiz, 33, 35
- Yom Kippur War, 51, 61,  
136, 146

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